

# RAILROAD GAZETTE

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## EDITORIAL ANNOUNCEMENTS.

**THE BRITISH AND EASTERN CONTINENTS** edition of the Railroad Gazette is published each Friday at Queen Anne's Chambers, Westminster, London. It consists of most of the reading pages of the Railroad Gazette, together with additional British and foreign matter, and is issued under the name Railway Gazette.

**CONTRIBUTIONS.**—Subscribers and others will materially assist in making our news accurate and complete if they will send early information

of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

**ADVERTISEMENTS.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our

editorial columns OUR OWN opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

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FRIDAY, AUGUST 11, 1905.

The chapter on lubrication, one of the series of articles by Mr. George R. Henderson on the "Cost of Locomotive Operation," which is printed this week, deals with a very important and interesting subject. The cost of lubrication for locomotives is only a small item, comparatively speaking, and yet, strange to say, there is no one detail of locomotive operation which is more carefully watched and kept down to the lowest possible figure. Some roads have even gone to the extreme of doling out a fixed allowance of oil per engine-mile, to the great disgust of the enginemen whose excuses for lost time due to hot bearings soon lose any originality in the eyes of the master mechanic or superintendent. It is quite true that most enginemen waste more oil on the outside of the bearings than ever finds its way to the wearing surfaces, but because one engineman uses more oil than another it is not a positive indication that he is more careless and wasteful. No two engines run alike, no two steam alike, nor do they wear their bearings alike. Many an old engineman has uttered his opinions of such "new-fangled notions" in strong and eloquent language, and then thrown up his job in disgust. How much oil should be applied to a bearing cannot be laid down by rule; lubrication requires intelligence and careful watching, with a little margin of safety at the expense of economy. It is cheaper to waste a gallon of oil than to delay a train an hour or so on account of a hot bearing, and it might be cheaper yet to instruct the enginemen in a general way how much oil is required for proper lubrication, how often it is required and more particularly where it is required.

While locomotive lubrication has been so carefully watched and such economy practiced, in the matter of car journal lubrication little or nothing has been done. In a 50-car freight train there are about ten times as many bearings as there are on an engine to get hot if insufficiently lubricated, or to waste oil along the roadbed if filled too full. A heated car journal can waste as much energy at the draw-bar and delay a train just as long as a hot bearing on the engine, and yet the inspection and maintenance of journals is given much less attention. A freight car journal seldom is repacked, and often is not oiled between periods when the car goes to the shop—periods which may vary from one month to three or four years. The inspection at interchange points is usually superficial as regards the condition of the journals, inasmuch as they are not a source of much danger even if in bad condition. If they do need attention the job

is left to a dollar-a-day repair man, who has no idea of how much or how little oil the bearing needs. He either puts in too little or fills the box up to the top with oil and waste, and allows a pint or two of lubricant to leak out around the dust guard. With 100,000 lbs. capacity cars proper lubrication is essential, for the journals are often subjected to loads even heavier than in locomotive bearings. If these cars are handled in dumping machines at coal and ore docks, little or no surplus oil is left in the bottom of the box when beginning the return trip, and if the packing dries up, as it will in time, the bearings are pretty apt to get hot. Broken axles have been known to result from such a cause, although rarely, but when a train is held up and has to limp into a siding behind time there is often the chance of a rear-end collision. Not a few accidents of this kind have occurred, a very recent one being the collision on the Pittsburg, Ft. Wayne & Chicago, at Clifton, Pa., last March, when a passenger train stopped on account of a hot box, and was run into by a following train, with the loss of seven lives. The damage resulting from that accident alone would have paid for all the oiling and inspection needed to prevent such an occurrence again on that road for years to come.

A regular passenger train carrying white flags in front and yellow flags at the rear is an unusual sight which was observed at Albion, Pa., recently. It is unusual only in a general sense, however; on the road where this practice is in vogue, the Bessemer & Lake Erie, the sight has been a familiar one for many months, and the practice seems to be satisfactory to the superintendent, the trainmen and all concerned. The use of yellow at the rear was adopted because of the adoption of green for "proceed." Yellow is the caution color, and it is the only one of the three colors—green, red and yellow—which can be used without inconsistency on the tail end of a train. The continued use of green for tail signals, after it has been made the standard color for "proceed," is, of course, highly inconsistent. Even if its use for proceed is confined to fixed signals, the inconsistency remains as a constant indication of an imperfect system, however long-continued may be the immunity from harmful results. Why should not every road which uses green for "proceed," proceed to abandon the use of that color for any other indication? The Bessemer & Lake Erie uses a yellow light in caution fuses. The use of green in fuses on a road where green is a proceed color involves a glaring contradiction; so glaring,

indeed, that one would be loath to believe that such a contradiction would be tolerated anywhere, were there not evidence of its actual existence. Inconsistencies and contradictions seem often to be tolerated in railroad practice on the ground that safety can be maintained in spite of them; yet it is familiar knowledge to the older generation of railroad officers that defective regulations have caused collisions after being in force without doing harm for 10 or 20 years; for so long a time that those who did not study the subject accepted them as perfect regulations.

The white flags at the front of the B. & L. E. train were there for the same purpose that they are used on engines throughout the country—to denote that the train was an extra; and it was an extra, so far as rights are concerned, as are all of the passenger trains on the Conneaut Branch of that road, because the block system is in use and no classification of trains is necessary. The abandonment of time-tables on this branch has been heretofore noted in the *Railroad Gazette*. Until quite recently the only time-table provided for the passenger trains was the advertising folder printed for the use of the public; but schedules for the trains are now shown on a page in the main line employees' time-table (and described as "extras") for the convenience of work-train conductors and other employees who need to know at what hours the passenger trains are expected. This full use of the block system has now been in force on this 16-mile branch for over six years, and with marked satisfaction. Besides the three passenger trains there are about 20 freight trains each way daily during the busy iron ore season. There is a piece of double track four miles long about the middle of the branch, but even with this the number of meetings to be made is so large that if there were no block system, and meeting orders had to be written out, repeated and delivered to conductors, the delays would materially reduce the capacity of the road. To insure vigilance in the towers, engineers are required to adhere strictly to the rule not to accept a clear block-signal unless they see it moved from the stop to the clear position after they have called for it. There is no permissive blocking. This abolition of time-table rights and dispatchers' written orders has now been extended over eight miles of the Meadville-Linesville branch and over a gauntlet of 1½ miles on the main line at the south end of the road. It would be perfectly safe, and a relief to passengers, to go one step farther in smashing the train-dispatchers' traditions, and abandon all engine flags. A white flag gives a sloop-like appearance to an engine (except for about one day, when it is new) and even adds to the disagreeable aspect of an engine that has run 200 miles since it was wiped. If an indication is really necessary, a pair of metallic enameled disks which could be easily cleaned would be much more suitable. But, with telegraph offices everywhere, and rights always conveyed by semaphore signals, why have anything? It seems to us that the simplification of operations above-described is highly commendable, and worthy of imitation. The abandonment of written train orders affords marked relief in managing train movements; and to assume that we cannot get the benefit of this relief except on a four-track road, running a hundred trains each way daily, is taking a very narrow view. It is true that with an increase in speeds or in the number of fast trains the B. & L. E. would probably feel the need of electrical control of levers between one tower and another; but the cost of that would be small compared to the security afforded by it.

One of the most significant things about this action of the Bessemer & Lake Erie is its decision *not* to abandon the time-table and written train orders on a 25-mile section of the main line where the stations have been provided with interlocked signals, and all other necessary preparations have been made. And for what reason? For the reason that it is difficult to retain a sufficient number of thoroughly reliable signalmen. The country is so thinly settled that living conditions are very unsatisfactory, and good men will resign their places rather than put up with the unpleasant features. The *Railroad Gazette* has preached the merits of the block system, in season and out of season, for many years; and in doing so has always included, as a vital element, the need of employing, in manual blocking, thoroughly competent and well trained signalmen. It is therefore gratifying to see this recognition of the principle. Too often railroad superintendents seem willing to put up with 18-year-old boys, or persons with more years but less brains, or those with a modicum of ability but a minimum of training. Evidently the B. & L. E. prefers to endure the troubles that

it has rather than voluntarily bring in a new kind. With the electric staff or other electric locking, safety could be assured with as low a grade of men as any superintendent's conscience would permit him to employ; but safety alone is not the only desideratum; traffic must move smoothly as well as safely, and to insure this there must be good men in the towers. The Bessemer & Lake Erie will have to take a leaf from the experience of the Panama Canal Commission, and provide imported civilization for its lonely signalmen!

#### THE ROCK ISLAND ORGANIZATION.

Early in 1904 the Rock Island changed its organization from a divisional to a departmental one, and a diagram showing the new organization was printed in the *Railroad Gazette*, Feb. 19, 1904. In accordance with the amended organization, the chief engineer, the engineer of maintenance of way, the general manager, the purchasing agent, the engineer of tests and the supervisor of the insurance fund reported direct to the fourth vice-president. Each department was kept as distinct as possible, with the result that the division superintendent, who is really the basing point of a divisional organization, was reported to only by trainmasters, chief dispatchers, station agents and yard masters; that is to say, he had no direct authority over the maintenance of his division and the management of its equipment. The supervisors reported direct to the engineer of maintenance of way, who in turn reported to the fourth vice-president; and the general superintendent of motive power, reporting to the general manager, had charge of the local superintendents of motive power, the mechanical engineer, electrical engineer and master mechanics, who in turn received reports from the road foreman of equipment, the foreman of car repairs and the roundhouse foreman. According to the old schedule, the division engineers reported to the division superintendents, who were under the authority of the district general superintendent. We called attention at that time to the fact that Mr. Loree's first important work after coming to the Presidency of the Baltimore & Ohio was to change the character of its organization from a departmental to a divisional one, while his first important work as President of the Rock Island System was to reverse this method of handling the road. The reason given for the change in 1904 was that the tremendous growth of modern traffic had so changed operating conditions that it is extremely hard to find a division superintendent who can solve operating and maintenance problems with equal brilliancy. Now, after a year and a half experience with this system and another change of the chief executive, the Rock Island is going back to a purely divisional organization. This is to be accomplished gradually and will not be completed until the President, Mr. Winchell, returns from Europe in the fall. At that time a new diagram will be gotten out, which will be shown in the *Railroad Gazette*. Those directly concerned with the working out of the departmental organization devised by Mr. Loree say that the trouble was that the division superintendents did not have any power except in purely traffic questions. When two or three of them got together for a conference, any decision involving maintenance had to be referred back to the department head. This occasioned delays and made it impossible to clean up the work of these conferences.

The Rock Island Company—which controls the Chicago, Rock Island & Pacific Railroad Company, which in turn controls the Chicago, Rock Island & Pacific Railway Company and the St. Louis & San Francisco; while the Chicago, Rock Island & El Paso and Chicago, Rock Island & Gulf roads operate independently but merge their accounts in the system reports—has a total mileage of about 13,000. Theoretically, great efficiency could be secured by having each department of this system in charge of an expert who would give his entire attention to his own specialty; but, as one railroad man expressed it, a company owning three or four department stores would never think of having one man in the central office look after his entire fancy goods department, another man look after groceries, another shoes, etc. He would inevitably place a competent manager in charge of each store and sub-divide his organization in that way. The division superintendent is really the man who corresponds to the local manager in this case, and the lesson of the Rock Island is that he must have full power. We wish to again make reference to the saying of Mr. Arthur Hale, that whenever a department escapes from the hands of the superintendent it is only too apt to forget that the object of a railroad is to provide transportation; that the engineer will build yards to hold cars instead of to move them, and the master mechanic will think more of his performance sheet than of the amount of tonnage moved.

## BOSTON STEPS IN.

On April 27 last the Interstate Commerce Commission, sitting as a board of arbitration, gave its decision as to the adjustment of the port differentials on export traffic between Boston, New York, Philadelphia and Baltimore. The decision left Boston's position unchanged as regards New York and made slight alterations in the differentials from the New York rate allowed Philadelphia and Baltimore—alterations which tended on the whole to reduce these differentials, although in the case of ex-lake grain Philadelphia was allowed a differential of 3 mills a bushel which it did not previously possess. At the time the decision was given and while the evidence was being submitted, New York and the southern ports were loud in their protestations, but comparatively little was heard from Boston. Boston now takes a prominent part in the discussion, supposedly settled, by presenting a report through its Chamber of Commerce committee on differential freight rates, in which it attacks vigorously the findings of the commission. On the questions of fact, the reader will find a sufficiently full statement in the abstract of this report which is printed on page 139. The illuminating part of this document is the abuse which Boston aims at the Commission—and aims with great accuracy—for inconsistencies of thought and judgment in making its decision and for an effort to please everybody by a compromise fair to nobody. Boston accuses the Commission of enunciating as facts statements contradicted by the evidence submitted; of striving to create an artificial division of the export traffic between the different ports; of strangling competition through a so-called equalization of advantages, and of advocating the beauties of a healthy struggle between localities in one paragraph, while in another paragraph it taxes traffic from New York because New York has advantages in the struggle. In one place, says Boston, the opinion lays stress upon distance as the most important factor, while in another it ignores its former view and conceives it to be of no consequence. The Boston committee upholds the dissenting opinion of Commissioner Clements (*Railroad Gazette*, May 26, 1905), and concludes with the sturdy statement that Boston would prefer to rely upon its own pluck, industry and foresight to secure its just proportion of the export traffic; but that if the advantages of a port are to be capitalized; if lack of facilities is to command a premium and their development is to constitute a handicap; if legislation is to compel what civic pride, local energy and liberal investment should command, then Boston wants its fair share in the distribution of favors.

Entirely apart from the questions of fact submitted for consideration, who can say that there is any other equitable reason for a differential than its fundamental use as a means for preventing railroad rate wars? The commission may talk wisely about the advantage of distance, or of grades, or of shipping facilities, and in effect penalize these advantages in order to give less favored ports a chance, but everybody knows that the justice of such a decision lies only in its convenience. That is where the weakness of Boston's position lies. In the absence of some kind of a differential basis for handling the great export traffic in certain staple, raw commodities from the West to the Atlantic ports, there have always been hurtful rate wars, and there probably always will be hurtful rate wars. These wars are stopped by certain railroads getting together, in such a way that the Elkins Act and other Acts do not notice them, and agreeing to live and let live. When an agreement of this sort is made, openly or tacitly, no one is in much of a position to complain, for the railroads sacrifice just as much traffic as the ports do, by agreeing to any kind of division.

When such a division is made by government, however, the whole aspect of the case changes at once. In this case the decision was an arbitration requested by the contracting carriers, who are therefore estopped from complaint; but should any one desire a practical and timely illustration of the way Federal rate regulation would be likely to work, let him consider that this decision of the commission, clearly representing its best thought on the subject, had the weight and force of statute, and was handed down not at the request of the carriers but at the demand of some angry port which felt that it was not receiving its share of the traffic. The student of economic conditions is invited to read carefully the statement of what Boston now thinks of the Interstate Commerce Commission, and then reflect how it would be if all the ports and all the railroads not specifically benefited were getting out memorials like that—memorials filled with taunts and cogent arguments which would be quite unanswerable, were the decision law instead of arbitration.

## RACING WITH LOCOMOTIVES.

High speeds for long distances are now very common on English and American railroads, and "record-breaking" runs are reported every few weeks. To what extent any given performance does actually surpass previous performances of the same kind is, however, in most cases hard to determine, and the reader of the accounts is likely to have left in his mind quite vague notions of what has been accomplished. Possibly the reader is not annoyed so much as the editor. Most readers have, we suppose, quite definite notions of the speed capabilities and the actual performances of one or more locomotives concerning which they are individually well informed; and as almost any published record can be so interpreted as to show that the other fellow's engine has not beaten one's favorite, why, there is no occasion for anything but satisfaction; but the editor, with his cold and lofty impartiality, and his duty to make an accurate comparison, has numberless difficulties. On short runs—from one to five miles—comparisons are perplexing enough, with the differences in grades, in weight of train, size of engine, weather conditions and other things; but when it comes to runs of 100, 200 and 300 miles the differences in favoring and hindering conditions are, in present circumstances, beyond fair computation, and the student of records finds himself constantly in the dark. Possibly, as we have said, the editor is the only person who cares anything about this darkness, but, really, when it is considered that these truly notable performances are the result of great skill, energy and patience on the part of a large number of men, it seems a matter of regret that the work cannot be measured more accurately and by universal standards. And if one has in his breast even a small spark of the sporting spirit, he must desire to see the efforts of different roads intelligibly compared. A mere statement of the distance, rate of speed, number of cars and the allowances of time for stops affords but scanty ground for a discriminating judgment.

These reflections have been elicited by the statement that on July 21 the westbound "Pennsylvania Special," with four cars, was run 300 miles on the Fort Wayne road at 66.18 miles an hour. This includes three stops, which are reckoned to have consumed nine minutes. The run was from a point east of Crestline, Ohio, to Whiting, Ind.\* Now, this is a very interesting event; but whether or not it is a "world's record" is a question concerning which one is left delightfully uncertain. The Lake Shore runs of June 12 and 13 were decidedly faster, but they were made with 3-car trains. The Lake Shore trains were run for a special purpose. This 300-mile dash was with a regular train, done just to make up lost time. The Lake Shore times were from start to stop; the Fort Wayne train appears to have had a flying start. The roads were, of course, different and there may have been other circumstances which ought to be mentioned in comparing the two runs.

The best runs that we can find for distances around 200 miles have been made from Erie to Buffalo on the Lake Shore, indicating, perhaps, that the grades, curves and city speed-limits are particularly favorable on that line; but is that really the case? Or, has Engineman Tunkey some knack (which he has imparted to some of his fellow runners on that division) by which he distances all competitors?

To have an ideal race it would be necessary to take a long stretch of double track, drive away all other trains, and start the locomotives side by side, as horses are raced. It would be interesting thus to compare different makes and designs of locomotives, but it would be desirable to have driving wheels of the same size on all of them, and to have the other conditions of the race, including the weight of the trains and number of axles, bear equally on both contestants.

Shall we ever have such a race? Probably not—or at least not for any great distance. It would be too costly even for a sporting millionaire. Not that our millionaires cannot spare the money; but they can get more satisfactory entertainment in other ways. No steam locomotive has been built entirely for speed. Every engine is designed to haul a train. Indeed, if we consider speed, pure and

\*The best speed that has been made on the Fort Wayne road for a distance of 200 miles is 71.3 miles an hour. This was with the special train of three cars which was run from Chicago to Pittsburg, June 8. On the same run a distance of 100 miles was traversed at the average rate of 77.2 miles an hour, and a distance of 50 miles at 79 miles an hour. The Lake Shore & Michigan Southern's special of June 13, consisting of three cars, was run 225 miles at 69.53 miles an hour; and 183 miles (Cleveland to Buffalo) at 73.2 miles an hour. The Twentieth Century Limited of the Lake Shore, westbound, on May 25, 1903, is recorded as having made 241.4 miles (Cleveland to Elkhart) at 66.12 miles an hour; but there appears to have been a deduction for a stop at Toledo. This train consisted of four cars, weighing about 250 tons. A writer in the *Railroad Gazette*, of Sept. 16, 1904, says that on May 9 of that year a train of five cars was run from London to Plymouth, England, over the Great Western, 246 miles, at 70.5 miles an hour. This included one stop. The weight of the cars is not given.



simple, the steam locomotive has not yet been tested to its limit over long distances, for every long run has been made with three or more cars. The only very fast run with less than three cars that we can recall is one which was made over the New York Central from Albany to Syracuse on September 24, 1895—148 miles—with two cars, in 2 hours 10 minutes, equal to 68.23 miles an hour; and that was for eight years the best record for that distance. If nobody builds a locomotive for speed alone, we may expect that the automobile will beat it, one of these days. Already an automobile has run 73½ miles an hour for 50 miles. This machine has an advantage in its low center of gravity and the elastic nature of its road and its bearing on it. To properly compete with it the steam locomotive will have to leave off its train and lighten its tender, and perhaps do a lot of other things.

We are not writing for the purpose of inciting any millionaire (or any railroad company) to devote money to making better speed; they might perhaps do more good by developing a flying machine; we simply call attention to one of the reasons why steam engines do not go faster. But, whether we do or do not ever have racing of locomotives under equal conditions, there will be considerable interest in knowing as fully as possible the conditions of those races which do take place. (The railroad managers usually aver that they are not racing; but if that is the case, they ought to muzzle their advertising agents.) Any one of the "Sunday Supplement" newspapers would, no doubt, be glad of the opportunity to make a record of the differences between the Lake Shore's 500-mile race course and that of the Fort Wayne, for the privilege of publishing an exclusive report of a contest in speed; but the trouble would be, probably, that the reporter would not possess a sufficiently discriminating judgment. Whether any competent railroad man is ready to try it, we do not know. At the best, the task would involve the weighing of some dozens of handicapping circumstances and conditions on each road; and some all-wise person would have to balance these. Possibly the task would be found to be so intricate as to drive us back to the position of the railroad managers—"we are not racing."

#### The Texas Damage Suit Industry.

The address on Texas damage suit cases, printed in this week's paper, gives some examples of the way the damage suit industry is conducted that would be most amusing if they did not indicate a state of corruption which, if not actually connived at by public sentiment in Texas, has at least been allowed to assume much greater proportions there than anywhere else in the Union. It is ridiculous that railroads operated certainly with ordinary care and skill should be obliged to pay in a single year 3.09 per cent. of their gross earnings in damages. The same hostility towards corporations in general and railroads in particular, which has been found good politics in many another state, seems to have become deep-seated in Texas, although Texas needs new railroads for its development as much as any state in the Union. There have been some recent evidences that the better public spirit in Texas is awakening to the injustice and short-sightedness of these perpetual attacks on the railroads. For example, the Hunt County (Texas) Grand Jury in its report June 11, 1905, said: From the testimony before us we conclude that certain lawyers in Greenville have secured before the convening of court, a full list of all the jurors summoned for the whole term, and have sent out men to notify all the jurors (these men pretending to follow some other business) and to find out how each juror stood on a certain character of cases; and, if unfavorable, the cases these lawyers represented were fully stated to the juror so that he would be disqualified to sit on the trial of the case, and in some instances the jurors had been told not to come to court. Then the lawyer would report to some member of the sheriff's force the number of men who would not be present of those who had been summoned as jurors and would advise the sheriff to fill up the panel with certain specified men, and on the Monday morning named these men would appear and get on the jury for the week. The Grand Jury said it had further evidence that a Greenville lawyer had requested men to be in Greenville on a certain Monday morning in order to get on the jury when he had cases to try; also, that while the jury was deliberating on the case in which a certain lawyer was interested, and when they were not kept together at night, he invited them to go to the opera house with him at his expense.

This kind of thing has been frequently pointed out by the railroads, but it is unusual and encouraging to have it come to the notice of the Grand Jury. In one case which is on the court records the complainant confessed that for fifty cents he induced one of the crew of a freight train to allow him to ride on a car of lumber. While getting back on the car after a stop for dinner the

train started forward and because of a defective handhold he fell to the ground. Simultaneously, some of the lumber which had been negligently piled fell on him, breaking his arm so that amputation was necessary; wherefore, he prayed the court through his lawyer to mulct the railroad company for \$40,000 damages. Of course, this man was a trespasser. With lawyers who make their living on contingency fees in cases of this kind and with juries packed as enumerated, it is not surprising to find a case stated where a brakeman who lived in Kansas, was employed on the Atchison, Topeka & Santa Fe and was injured in Colorado, moved to El Paso and established residence in Texas in order to sue there. Not long ago a man was convicted of suborning witnesses, and was fined and imprisoned. He testified: "Well, it's this way. Whenever you hear of an accident you get on the spot as quick as you can and get the injured man to sign a contract with your lawyer to defend him, and then you also work up evidence. Another thing is that whenever in conversation you hear any man express himself as friendly to corporations you take his name and report it to the lawyer you are working for, and the name will be scratched if it ever goes on a jury list." The man who engages in this type of professional service in Texas is known as a booster. The Texas daily press has recently concerned itself far more than in previous years with this topic, and the best papers are taking a very helpful stand for decent and honest trials. They are also inclined to discuss the equity of constant payments for actual hurts. For example, the *Tyler Daily Democrat-Reporter* says: "A man building a house for another falls from the scaffold and is seriously and permanently injured, yet he never thinks of suing the owner of the house for damages. The same man will hop off a moving train and smash his nose against the ground and sue the company for damages, and nine times out of ten he will recover."

The ambulance chaser and the shyster lawyer will be always with us, but if Texas has gotten to the point where it sees that such a state of affairs exists and condemns it through its influential journals, half the battle is won. It is hardly to be expected that the next few years will see progress in the damage suit business like that from \$223,749 in 1891 to \$1,873,777 in 1904. The general welfare of the state will surely be benefited by the decline of this particular industry.

#### Information to Carry Around.

Heads of departments of railroads nowadays cannot possibly carry in mind even the principal information pertaining to various details of their departments, although the extent to which one is able to do so is an important factor in the successful administration of his department. As long as he is in his office there may be little or no necessity for the exercise of such ability. Away from headquarters, however, there may be and usually is constant need for various facts and information pertaining to department affairs. To have essential data of this nature arranged in some form so as to be immediately and quickly available would be highly useful under such circumstances. And it is comparatively an easy matter to have this information prepared in some compact and convenient shape to carry around. By tabulation and orderly classification and arrangement of data, a great mass of information can be condensed into comparatively small compass. A lesson can be taken from the engineering pocket books in this respect. We know of a Superintendent of Motive Power who has an admirable plan of this sort. He makes use of a loose-leaf, leather-bound, marginal-indexed book, having pages 4¼ x 7¼, the size being convenient for the coat pocket. An examination of this volume reveals data comprehending practically all vital information pertaining to his car and locomotive departments. Among other things is a table of the total number of men in his employ classified by stations, or points, showing monthly salary or hourly rate for each; a list of the total number of men at each point by months and the number at all points classified by occupations; shop and office total payrolls by divisions and months, also by stations; a recapitulation of locomotives by divisions, showing the number and kind on each, whether working, in shop or waiting, etc.; a comparative statement of motive power department expenses and results, by months; locomotive performances on coal and oil; car mileage and cost of repairs to passenger and freight cars by months; cost of certain shop operations; costs of important supplies, of parts of cars and locomotives, and of labor of applying; tractive power of the various types and classes of locomotives owned, their tonnage rating, horse-power, principal dimensions, names of builders, etc.; and a large amount of other such information ready to hand not only for his own constant reference, but to enable him to supply instantly any information asked for regarding his department in conferences with his superior officers.

The wisdom and advantage of some such practice is too evident to need argument. A busy officer might probably feel that he has not the time to prepare such a book and keep it up to date. That is not necessary, however, as the work should be delegated to some subordinate in the office whose duty it would be to regularly prepare



current data, and to make such revisions in the permanent data as may be necessary from time to time.

A press despatch says that the Pennsylvania has issued orders "that hereafter the water supply for passenger cars must be handled by men wearing white gloves and white duck overalls, which must at all times be clean. The object is to insure that the water shall be free from contamination."

Good! That would be an excellent idea on many roads that we could name. And on some of them the present practice suggests the desirability of sundry other improvements: such as galvanized iron pails not brown with sediment (or age); ice-barrows clean enough to be distinguishable from grease-receptacles; drinking cups of such material and color that the passenger can see for himself that they are clean, and not be obliged to take them on faith; men who in handling water and ice will have clean hands as well as clean clothes. Many men are so innocent of any notion of strict cleanliness that their conduct is laughable. One observed by the writer the other day came into a coach at a division terminal and, removing the cover of the drinking-water tank, felt for the surface of the water with his hand, to see if there were need of replenishing the supply! This was nothing very dangerous, either to the prospective consumer of water or to the microbes disturbed by the unceremonious inspection; but a trifle funny. Why not have a glass front in water-receptacles? Of course, all this has to do with superficialities, after all. The most important assurance to be given to the passenger is that the drinking water is clean and pure at the point where it is procured; and as a constantly increasing proportion of our passengers live in cities, where suspicion of the quality of water becomes second nature, it will not be strange if the demand for purity and cleanliness increases.

#### NEW PUBLICATIONS.

*The Organization of Ocean Commerce.* By J. Russell Smith, Ph. D., Instructor in Commerce, University of Pennsylvania. Published for the University, Philadelphia, 1905: Ginn & Co., 29 Beacon Street, Boston, Mass., Selling Agents. 155 pages, 6¼x10 in.; with a Map.

Dr. Smith has given a very careful and a very full discussion of a branch of transportation which has not received the attention it deserves. He gives by far the best account we have seen of the charter traffic, which forms so important a part of ocean communication. By including in his book a statement of the trades which are respectively adapted for line steamers and for charter steamers and by going fully into the economics of each of these types of ships, he shows that in the vast majority of the many hundred of ports upon the ocean the bulk of the commerce is limited to a very small variety of articles, often a single article; and that, again, is only shipped during a part of the year. It is most likely to be a raw product, cheap and heavy, which must be carried at as low a rate as possible. This, then, is not work that can be done by the carefully organized line of vessels. This simpler, unorganized and cheaper service falls to the independent vessel that is for hire and works as a unit wherever there is work to be done. Such vessels carry a large share of the world's trade, and are utilized for any trade that may go in shipload lots. Economy is much more to be desired than speed in their operation. For example, the *Baron Eldon*, built in 1899, with a dead weight capacity of 6,100 tons, burns only 22 tons of coal a day at nine knots, which is at present about the equilibrium in speed, above which additional speed costs more in outlay than it adds in income, and below which a lessened speed costs more in loss of earning power than it saves in operating expenses. Dr. Smith describes in great detail the exact way in which this charter traffic is handled, and it is extremely interesting to read of the competition for temporary cargoes at ports in odd corners of the world and of the routes which are planned so as to afford the ship a back haul, if possible. Chapter 3 is devoted to line traffic as compared with charter traffic, and gives the general rules clearly and fully. Chapter 4, on ocean freight rates, explains the tendencies of these rates, and among other interesting things recounts how the quick return of prosperity from a period of depression occurring in 1898 and 1899, at the same time with the onset of the Boer war, which took a large amount of tonnage out of ordinary service, caused a great demand for vessels and occasioned much new construction, an over-production of which has kept the traffic very dull ever since. There are also interesting chapters on the leading steamer routes, on coal supply and coaling stations, the effects of the Panama Canal on trade routes, the competition of steam with sailing vessels, etc. We know of no other book that gets the salient points of the rules of ocean commerce into such small space and expresses them so clearly.

*Railway Provident Institutions.* Relief and Insurance Departments, Pensions, Hospitals, Savings Funds, Libraries and other Welfare Work on Railroads in English-Speaking Countries. Published by M. Riebenack, Philadelphia.

This is a reprint, amplified with much additional matter, of the paper prepared by Mr. Max Riebenack, Comptroller of the Pennsylvania Railroad, for the Seventh Session of the International Rail-

way Congress; and it makes a book of 400 pages, about 5 in. x 7 in. An abstract of the main parts of Mr. Riebenack's paper was given in the *Railroad Gazette* of January 6 last, having been condensed by the author for an address before the National Civic Federation. Mr. Riebenack's material was gathered from all countries in the world using the English language, that being the scope of his inquiry as laid down by the Congress; and he gives the data classified by countries. In the United States he had responses from 140 roads, and in Great Britain and Ireland from 34. The present work is systematically arranged and elaborately indexed, and it covers not only ordinary relief and insurance associations and departments, but everything concerning pensions, hospital service and libraries, and much information about the Young Men's Christian Association and the railroad brotherhoods. The book appears to have been published by Mr. Riebenack himself.

#### TRADE CATALOGUES.

*Draft Gear.*—The Bradford Draft Gear Co., Chicago, has a new design of spring draft gear, and has issued a catalogue illustrating and describing it. It is made with one, two, three or four parallel springs, the three-spring design being the standard gear. The greatest amount of space is therefore devoted to the latter, all of the details being illustrated and fully described. There are two half-tones from photographs showing a four-spring gear applied to the steel underframe of a Union Tank Line car. Other designs, including twin-spring for low-bodied cars, designs for passenger cars, locomotive pilots and elevated railroad cars are shown, also a design of friction gear. There is also a copy of a report by Prof. Goss, of Purdue University, covering tests of two Bradford gears under static load.

*New Nevada.*—The passenger department of the Southern Pacific has issued a pamphlet of 65 pages, profusely illustrated, in which the future of the State of Nevada is set forth in the glowing terms of the land promoter. It contains a large amount of information on the agricultural and mineral resources of the state, the irrigation projects now under way and statistics of the principal cities and towns in the state.

*Electric Railroad Construction.*—J. G. White & Co., New York, are distributing an announcement of the organization of the Canadian White Company, Lim., of Montreal, to carry on an engineering and general contracting business in Canada. The announcement contains a partial list of the work now under contract by J. G. White & Co., of New York.

*Dielectric Products.*—A little pamphlet issued by the Dielectric Manufacturing Co., St. Louis, Mo., gives prices of insulating materials made by that company. It is rather more than a price list, describing briefly the properties and advantages of some of the special products. The pamphlet is a neat piece of work both in design and composition.

*Reinforced Concrete.*—The Cummings Structural Concrete Co., Pittsburg, sends a pamphlet telling of the advantages of reinforced concrete in general and describing some interesting patented methods of construction used in the Cummings system. It also gives measurements and details of several structures built on this system by R. A. Cummings.

*Roofing.*—The Standard Paint Co., New York, sends the July issue of *The Exchange*. This number emphasizes the economy in painting Ruberoid roofing every few years with Ruberine, as only in this way can the user get the best service out of the roofing. As usual, it devotes considerable space to suggestions to agents.

*Turret Lathes.*—The latest bulletin of the Gisholt Machine Co., Madison, Wis., describes the wing rest or auxiliary tool post holder which is supplied on Gisholt turret lathes when specified. The attachment is a useful and convenient one for turning pieces of extra length or diameter.

*Electric Generating Sets.*—The Crocker-Wheeler Co., Ampere, N. J., is distributing Bulletins Nos. 56 and 57 describing small generator sets from 2½ k.w. to 21 k.w. capacity. These sets have Crocker-Wheeler dynamos and are furnished either with Forbes engines or with Case engines.

#### Railroad Employees and Rate Regulation.

The following extract from a recent issue of the *Railroad Trainmen's Journal* shows that three, at least, of the brotherhoods of railroad employees are in accord with the attitude taken by Lucius Tuttle, President of the Boston & Maine, in his address last spring in which he pointed out that Federal rate regulation was certainly undesirable from the standpoint of the employee:

The leading organizations of railroad employees have taken a

position to the effect that it would be unwise and unbusinesslike to arm any government commission with the authority to prosecute, defend and judge so important a matter as the rate that shall be paid for the transportation of freight on our railroad systems.

The right of supervision, the power to demand and enforce fair treatment to shippers, and other rights, that are clearly within the power of government are not questioned. It is the proposition to place in the hands of a commission, the members of which have no training in railroad operation and who do not know the necessities of rate making, the full power to make a rate, bring their own arguments to defend it, enforce their decision and practically operate a railroad without being responsible for the results to the company. As railroad employees we know that when railroad revenues are affected we must assist to make good the reduction. We do not anticipate wage reduction but we can reasonably look for increased burdens that are difficult to oppose in the operation of any business where perfected machinery and public demand make it possible.

The position of the Brotherhood of Locomotive Engineers was thus expressed in its official publication: We believe the Esch-Townsend bill will have to be very much modified before it can pass the Senate; but every sub-division of the B. & L. E. in the states should take an interest in this subject, which they ought to feel is very near to them, for the interest of the railroads, in a large sense, is their interest, not that it would result in the reduction of wages, but would, in all probability deter any advance and would likely make it more difficult to sustain what we have, and it would be a good move either to see or write each Congressman and Senator, and express disapproval of any measure which would take from the railroad management the rate-making power. Let the law be amended, if necessary, to give the commission power to cure such evils as are complained of, and give it unqualified authority to enforce the Interstate Commerce law.

The Order of Railway Conductors made its position known in the following resolutions passed by the recent convention:

Resolved, That we respectfully represent to Congress the inadvisability of legislation vesting in the hands of a commission power over railroad rates, now lower by far in the United States than in any other country; that this low cost of transportation is the result of the efficiency of American railroad management and operation, which have built up the country through constant improvement in service and development of territory, while at the same time recognition has been given to the value of intelligence among employees, in contrast to foreign methods where high freight rates and lowest wages for employees obtain; that the freight rates of this country average only 2 per cent. of the cost of articles to the consumer, thus making the freight rate an insignificant factor in the selling price, numerous standard articles being sold at the same price in all parts of the country; and be it further

Resolved, That regulation of rates by a government body would, in the opinion of this convention, result in litigation and confusion, and inevitably tend to an enforced reduction of rates irrespective of the question of the ability of the railroads to stand the reduction, especially in view of the increased cost of their supplies and materials; and be it further

Resolved, That the proposed legislation is not in harmony with our idea of the spirit of American jurisprudence, inasmuch as it contemplates that a single body shall have the right to investigate, indict, try, and condemn, and then enforce its decisions at the cost of carriers, pending appeal, which is manifestly inequitable; and that if there is to be legislation on this subject it should be such as would secure and insure justice and equity, and preserve equal rights for all parties concerned, but in view of the facts, legislation affecting rates is not called for at this time, and would be inadvisable.

The Brotherhood of Railroad Trainmen made its position known through the adoption of the report of its committee on reports of Grand Lodge officers, at its recent convention held at Buffalo, N. Y., May, 1905, which reads, in part, as follows:

The usual acceptance of the term "rate regulation" is rate reduction. Regulation of freight rates is never thought of as to be applied to raising a prevailing rate by the power of a court or commission. The real issue, then, of rate regulation is one of rate reduction, which means a loss of revenue to the railroad companies, and just how far reaching this loss would be is a matter for conjecture.

The proposition now before the people of the United States is one that proposes to clothe the Interstate Commerce Commission with the power to make a rate, and to permit the railroad companies, or the shipper, to appeal to a court if the rate fixed is not regarded as fair. With this proposition there naturally goes an arbitrary power to fix a rate without holding the Commission responsible for disadvantageous results. The controlling idea, which is to take from the railroad companies what rights they have under existing laws for their protection in fixing and maintaining a maximum rate, is decidedly unfair.

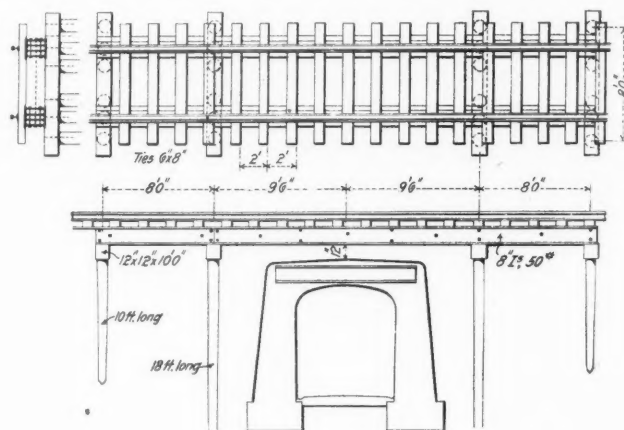
This organization does not stand as an apologist for railroad

wrongdoing, or as a champion of the railroad corporations as against the rights and interests of the general public. It does not seek to interfere between the railroad companies and the public in the proper administration of law. It believes that there have been abuses in railroad rate making and maintenance that have discriminated against certain interests, and in favor of other interests, which were positively wrong and should be discontinued, and which, we think, can be done under the laws as we now have them. Practices of discrimination are not condoned, but there is a remedy for them within the present law. Its application would be a far different matter from authorizing any court, or commission, with the power to fix a rate regardless of the effect of such a rate on the business operation of the railroad company affected.

We believe the laws should be enforced against discrimination, rebates and preferentials, thus insuring fair and equal treatment to all concerned, but we do not believe in empowering any commission with the authority to make a rate. As railroad employees, we feel that the railroad companies must be protected from imposition and unfair legislation, and be allowed to manage their business fairly to the end that good service and wages be maintained, and a fair profit on railroad investment be assured.

#### Reinforced Concrete Passenger Tunnel—C. R. R. of N. J.

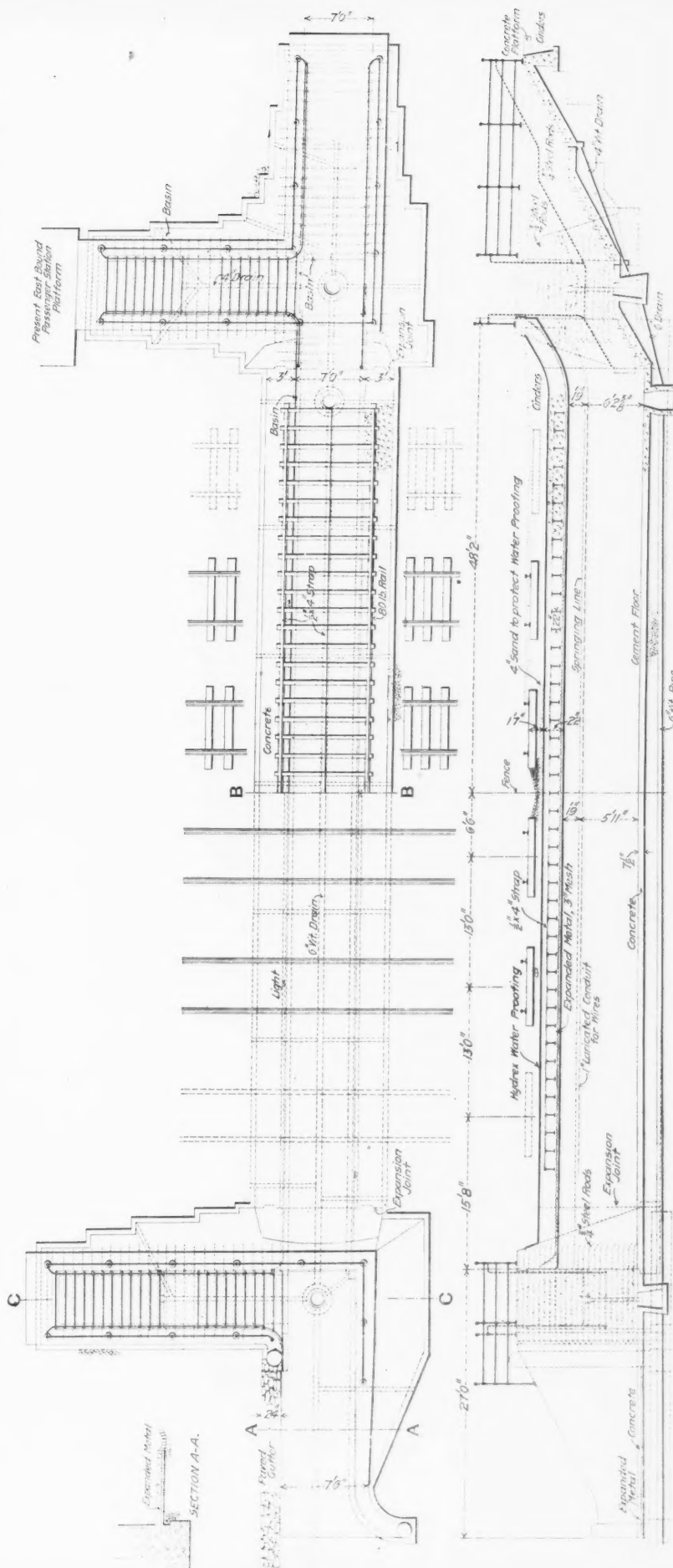
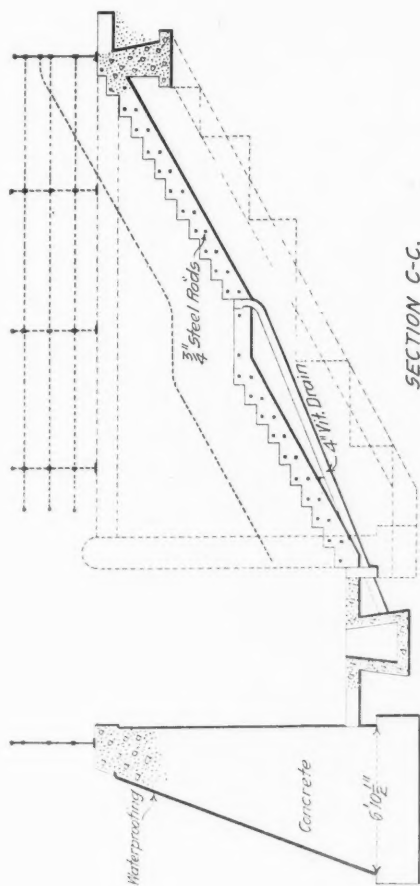
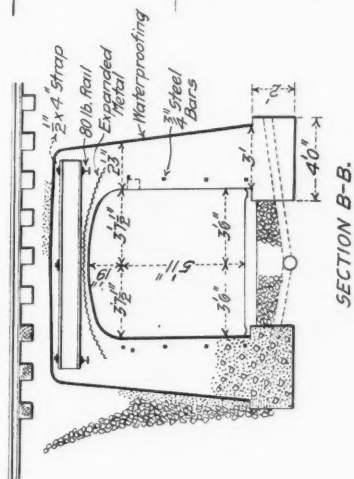
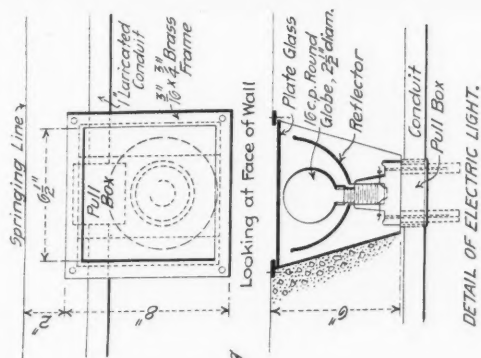
The accompanying illustrations show the plans of a reinforced concrete passenger subway, or tunnel, which the Central Railroad of New Jersey is now building under its main line at Netherwood, N. J. The tunnel proper is 96 ft. long by 6 ft. wide at the base and has a maximum height of about 7 ft. 8 in. The side walls have a maximum width of 3 ft. at the base and a minimum width of 2 ft. 3 in. at the top. They are reinforced, as indicated in the cross section, by  $\frac{3}{4}$ -in. medium open hearth steel rods. The roof is rein-



Plan and Elevation of Temporary Trestle. Concrete-Steel Passenger Subway, C. R. R. of N. J.

forced with expanded metal and 12-in. I beams placed at 22-in. centers, resting on 80-lb. rails. The I beams are held in position by means of three  $\frac{1}{2}$  in. x 4 in. flat iron strips, as shown. The foundation for the floor consists of 7  $\frac{1}{2}$  in. of concrete laid on a broken stone foundation. The finished surface of the flooring and steps is of 1 in. cement mortar composed of one part Portland cement and two parts sand. To give this finish a dark color 2 lbs. of lamp black is mixed with every barrel of cement. The concrete in the foundation and abutments to elevation, and in all retaining walls and foundations for steps and flooring is composed of 1 part cement, 2  $\frac{1}{2}$  parts sand and 5 parts broken stone. The concrete in the roof of the tunnel is of 1 part cement, 2 parts sand and 4 parts broken stone. The stone in the concrete for the footing courses is of trap rock and does not exceed 1  $\frac{1}{2}$  in. in any direction. Stone not exceeding 1 in. in any direction was used for the concrete in the floor, steps, retaining walls, abutments and the roof of the tunnel. The expansion joints are located as shown in the illustrations and the adjacent portions of the wall are separated by two layers of building paper. The outer surface of the structure, as indicated in the drawing, is water-proofed; the water-proofing being applied as follows: First, a hot coating of "Hydrex" compound was applied; this was allowed to thoroughly dry, and four layers of Hydrex water-proofing felt, laid shingle fashion, was cemented together by hot Hydrex compound. A ledge, or shoulder, is formed in the side walls of the steps under which shoulder the water-proofing is flashed, so as to prevent water from getting in behind the water-proofing. The drainage system—which is one of the most important features in connection with subway work—is well taken care of. It consists of catch-basins, located as shown, connected with 4-in. drain pipes to a 6-in.





main drain pipe having a rake of 2.15 ft. in 100 ft. and an outlet 210 ft. from the mouth of the subway. All pipe is salt glazed vitrified stoneware sewer pipe. The pipe outside of the steps and tunnel bottom is joined by caulking the sockets with rope-yarn gaskets and then filling with cement mortar of one part of cement and two parts of sand. All pipes under the steps and floor of the tunnel are laid with open joints. Five electric lights are placed in the tunnel as shown in the illustration. The center light is wired separately from the others, and the wires for this light are arranged so that it can be turned on by a switch in the ticket office of the station. The other four lights are on one circuit and are also arranged to be turned on and off from the station. The wires for the lights are carried in a loricated conduit of 1 in. inside diameter, built in the concrete walls of the tunnel. In other subways along the line of the C. R. R. of N. J. ordinary 16 c. p. incandescent lamps held in sockets and projecting out into the subway are used. Considerable annoyance has been occasioned by the frequent breaking of these lights, and to overcome this the lights in the Netherwood subway are to be made as shown in the detailed drawing, and placed in recesses in the walls of the tunnel. To facilitate work in the subway during the construction the four main tracks had to be raised 12 in. and carried on a temporary trestle made as shown in the accompanying illustration. For the above illustrations and information we are indebted to Joseph O. Osgood, Chief Engineer, C. R. R. of N. J., in whose office the subway was designed.

#### The North-Western's New Line to Milwaukee.

The Chicago & North-Western has three lines out of Chicago. One runs due west to Omaha, another northwest to St. Paul and Minneapolis, and the third north along the lake shore through Milwaukee. All three leave the city as double-track lines. From Wells street station to Clybourn Junction, three miles out, the latter two are combined as a four track line. The road has its heaviest suburban traffic on the lake shore line, which traverses an almost continuous series of populous suburban towns all the way to Milwaukee. The freight and through passenger traffic on this line is also extremely heavy, and long ago the combined traffic had attained a volume that taxed its two tracks beyond their capacity, particularly at the south end, where the suburban traffic is densest.

The first measure of relief to be adopted was the building of the Mayfair cut-off some 15 years ago. As will be seen from the accompanying map, it leaves the main line at North Evanston, running southwest to Mayfair Junction and south to large freight yards at 40th street, Chicago, enabling all through freight traffic to be diverted from the very busiest portion of the main line, to the 40th street yards, and through them south to Wood street yard when necessary.

As the growing volume of suburban traffic extended northward, further relief became necessary, and it was first proposed to build a third track as far as Lake Forest. However, this plan was abandoned in favor of the construction of a third and fourth track from Lake Bluff southward a short distance west of the existing line to juncture with the Mayfair cut-off, which enabled through passenger and freight traffic to be diverted from the shore line between Lake Bluff and Chicago. This new line, built two years ago as the Chicago Northern, is 22.2 miles long.

But the line north of Lake Bluff soon evidenced the need of enlarged capacity. The Rockford line, or Kenosha division as it is known, joins the Milwaukee division at Kenosha, Wis., 52 miles north of Chicago. This branch line contributes a considerable traffic, the ice business in the summer time being particularly heavy as the line traverses a lake region where a large amount of ice is harvested. In order to avoid interference with the passenger traffic as much as possible, which, of course, is heaviest in the day time on account of the suburban trains, as many as possible of the freight trains were run at night. But the situation was far from satisfactory and it was therefore decided to extend the third and fourth tracks through to Milwaukee.

The idea at first was to have these tracks adjacent to the existing line, but this was abandoned for several reasons. One was the presence of several small cities on the line, such as Kenosha, Racine, etc., where additional right-of-way across the town would have to be bought at large expense. Also the multiplication of grade crossings at these places was a serious objection. Furthermore, an investigation showed that by building this third and fourth track as a separate line a short distance west of the shore line, not only could much lighter maximum grades be obtained, enabling larger tonnage trains to be hauled, but also all towns, with their accompanying grade crossings, would be avoided and with them the need of frequently reducing speed or stopping whether traffic and operating conditions required it or not.

The new line, work on which began May 1st, is about 53 miles long, and it probably comes as near to being an air line as any equal length of road in this part of the country. Starting from Chicago and State Line Junction on the Chicago Northern, a mile and a half southwest of Lake Bluff and about a mile west of the shore

line, it runs northwest on a nine mile tangent to a point  $3\frac{3}{4}$  miles west of the latter, where 13 deg. of 30-min. curve occurs. There is then a 13 mile tangent followed by 6 deg. of 30-min. curve; a 10 mile tangent and 7 deg. of 30-min. curve; a  $4\frac{1}{2}$  mile tangent and 4 deg. of 30-min. curve; a 7 mile tangent and 12 deg. of 30-min. curve; then five miles of tangent to connection with the Milwaukee division near St. Francis, three miles from the Milwaukee station. From this point the new line continues as third and fourth tracks of the Milwaukee division on the old right-of-way as far as the Bay View interlocker just south of Kinnikinnick river, where there is a double-track bridge. The work in Illinois is being done under the name of the Chicago & State Line Railway, while that in Wisconsin is under the name of the Milwaukee & State Line Railway.

The former has 16 $\frac{1}{2}$  miles and the latter practically 36 miles, including the two miles from St. Francis to Bay View, making something less than 53 miles total.

As would naturally be inferred, the work on most of the line is moderate. The maximum gradient is  $\frac{3}{10}$  of one per cent., or 15 ft. to the mile, against  $\frac{9}{10}$  of one per cent. on the old line. The curves, as already stated, are all 30 min. There are several fairly heavy cuts and fills. On the first three miles from the south end there is heavy borrow work. For the next five miles the work is light, but at mile eight there is a 56,000 yd. cut. In miles nine and ten there are two cuts aggregating about 100,000 yds. Mile 12 has a 83,000 yd. cut, miles 16 and 17 have each a 56,000 yd. cut, and 19 and 20 each 55,000 yd. cuts. The next 18 miles is all moderate work, but miles 48 and 49 have a 190,000 yd. fill, and 49 and 50 a 340,000 yd. cut starting at the north end of 49 and extending through 50. This cut is through St. Francis hill, and it will have a maximum depth of 35 ft. It was stated that the maximum grade will be  $\frac{3}{10}$  of one per cent. This should except the grade coming out from Milwaukee through this cut, which will be  $\frac{2}{10}$  of one per cent. This was to avoid carrying the bottom of the cut below the surrounding drainage level.

Root river crossing is the only bridge of any size on the line. It occurs about five miles north of a point opposite



Chicago & North-Western's New Line to Milwaukee.

Racine and consists of five 70-ft. deck girders which ultimately will be placed on masonry piers. Temporary pile piers will serve until the line is completed so that the masonry material can be hauled in cheaply. All subway abutments will likewise be of piling temporarily. The culverts are cast-iron, three sizes of pipe being used, viz., 24 in., 36 in. and 48 in. There are some 1,500 ft. of the last and a considerably greater amount of the 36 in. The highway crossings are mostly at grade, the country being too flat in most cases to permit grade separation at reasonable cost. Out of 50 such crossings, seven are overhead and three underneath. There are four railroad crossings which include the Elgin, Joliet & Eastern, the Chicago & Milwaukee interurban electric lines branch from Lake Bluff to Rockefeller, the Kenosha division of the North-Western, and the Racine branch of the Chicago, Milwaukee & St. Paul. All of these will be interlocked. The three steam road crossings are to be all-electric



and that of the electric road probably mechanical. The line will be laid with 90-lb., 33-ft. rails. The 30-ft. rail has been standard on the North-Western heretofore. White oak ties and gravel ballast will be used throughout, the minimum depth of ballast under the ties being 12 in.

Although there are no towns on the line, six stations have been provided for. No names have been assigned to them and at the present time they are distinguished by numbers. No depots will be built as it is not expected that any local business will develop because of the proximity of the old line and of the Chicago, Milwaukee & St. Paul. These stations will have necessary passing tracks, a telegraph office, etc. Station 4, the crossing of the Kenosha division, will be the most important, because of the interchange of traffic between the two lines. It will have coaling and watering facilities, ash pits, etc., storage tracks, Y connections between the two lines, and a large building for employees. The other stations have two passing tracks, each 4,000 ft. long in the clear, giving capacity for 100 cars.

This new line, with its light grades and curves, will enable fully 30 per cent. greater loads to be hauled than the present line. It will be worked at first by the telegraph block system. Later on, if conditions require, automatic block signals will be installed. The completion of the line will relieve the present line of all through freight and passenger traffic. It will also permit a material reduction to be made in the running time of through trains between Chicago and Milwaukee, should such a condition become desirable or necessary. An interesting and important feature of the scheme is the flexibility of operation which will be afforded by the several connections between the two lines. These cross-connections will enable trains to be diverted from one line to the other as operating and traffic conditions require.

As already stated, construction work was actively begun May 1st. It is expected that the line as far as Kenosha division crossing will be completed and in operation not later than Dec. 1st of this year. This will relieve greatly the present line by cutting off from it the freight traffic to and from the west over the Rockford line. Most of the remainder will probably be completed this year, but the contractors have until July, 1906, to finish on account of the St. Francis hill cut, which is so situated that only one steam shovel can work on it.

The work is being done under the supervision of Mr. E. C. Carter, Chief Engineer of the Chicago & North-Western, Mr. C. T. Dike being Resident Engineer in charge of construction. The contract for clearing, grading, track-laying, surfacing and ballasting was let to Winston Brothers Company, Minneapolis, Minn.

#### Switch Engines for Bridge Service at Cincinnati.

The Chesapeake & Ohio recently placed in service eight locomotives of the type shown in the accompanying illustration, for use over the Cincinnati bridge. They pull heavy trains from Covington, Ky., on the C. & O., to Ivorydale, Ohio, on the C. H. & D. They weigh 142,500 lbs. in working order, have 20-in. x 28-in. cylinders with piston valves, and a tractive power of 30,600 lbs. Superin-

have been paid by Texas railroads on account of personal injuries, from 1891 to 1904 inclusive, the following amounts:

1891.....\$223,749	1896.....\$487,402	1901.....\$1,457,973
1892.....284,726	1897.....472,799	1902.....1,765,653
1893.....293,042	1898.....508,645	1903.....1,940,531
1894.....333,338	1899.....657,739	1904.....1,873,777
1895.....464,768	1900.....1,018,637	

The same authority gives for the fiscal year ended June 30, 1903:

Ratio of income to commission valuation of properties.....6.41 per cent.  
Same year, ratio of payments for injuries to gross earnings.....3.09 per cent.

Startling as are these figures when considered only as an item of operating expense, they become a source of anxiety and even of alarm to the managements of this important commercial interest when compared with similar data from adjacent states and territories in which transportation conditions are substantially the same.

From data for the year 1899 supplied by a large number of railroad systems operated in the west and southwest, many of which are allied with railroad interests in this state, it appears that there were:

Outside of Texas .....1 injury for each 49 miles of road.  
In Texas .....1 injury for each 14 miles of road.

	Per mile of road.	Claimed.	Paid.
Outside of Texas amounts in suits were.....	\$180.00	\$9.48	
In Texas amounts in suits were.....	1,208.00	\$2.04	

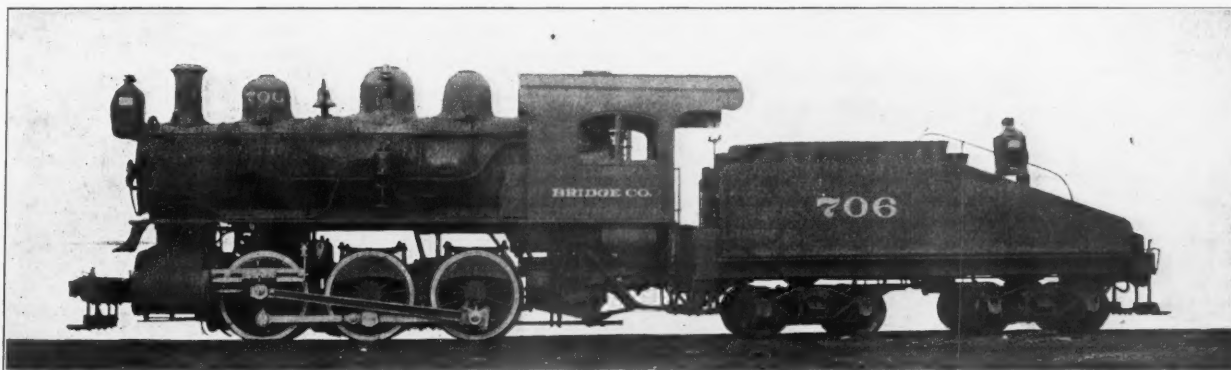
By some of the lines operating systems both in and out of Texas in 1899, the following sums were paid for damages for personal injuries:

	Per mile of road.
Atchison, Topeka & Santa Fe, outside Texas .....	\$4.19
Gulf, Colorado & Santa Fe, inside Texas .....	36.83
Missouri, Kansas & Texas, outside Texas .....	19.73
Missouri, Kansas & Texas, inside Texas .....	217.66
St. Louis Southwestern, outside Texas .....	2.30
St. Louis Southwestern, inside Texas .....	7.48
Southern Pacific (in 1902), outside Texas .....	20.00
Galveston, Harrisburg & San Antonio (in 1902), inside Texas .....	500.00

Not long since I had occasion to examine the record of an accident which occurred in the northern part of the state. The facts of the accident and the responsibility of the company were clear enough; a collision in the yard between a switch engine and a passenger train. One of the passengers hastened to his home and employed a lawyer, and within three days from date of accident filed suit for heavy damages. Representatives of the company endeavored to adjust plaintiff's claim for injuries, and asked permission for a medical examination by its chief surgeon, or by any reliable disinterested physician, with the view of ascertaining what would be a fair compensation. This was refused by both the attorney and his client; later on, however, the attorney submitted for consideration of the company an opinion of the patient's family physician, offering it as the only basis upon which an adjustment could be made. The opinion read as follows:

"Traumatic injury of spine; partial paralysis of lower extremities; nervous system a perfect wreck; never will be able to perform any labor requiring use of lower extremities; bladder and sexual trouble as consequence of injury to the spinal nerves; Mr. — is a physical and nervous wreck."

As the company was clearly liable, and had no other or better



Six-Wheel (0-6-0) Switching Engine for the Cincinnati Bridge.

tendent of Motive Power Walsh, of the C. & O., reports that in the three months that they have been in service they have given excellent results. They were built at the Richmond works of the American Locomotive Company.

#### Doctors and Damage Suits.

The following extracts are taken from a paper entitled "The Doctor and the Damage Suit," recently read at Galveston by Mr. T. Fay, General Manager of the Southern Pacific Texas lines, and printed in the *Houston Chronicle*:

According to the reports of the Railroad Commission, there

medical evidence, it paid \$9,500 in settlement, and the patient, cured, as by a miracle, returned to his work, and has ever since been earning the same wages in the same line of employment as before the accident.

Another case is that of a fireman who was injured in West Texas, and brought suit for damages, claiming total paralysis of lower extremities. He was brought into court in a wheel chair, and by agreement of physicians, three of whom were appointed by his lawyers and four appointed by the company. The plaintiff's physicians testified positively that he was paralyzed, and would never walk again. Those appointed by the company testified that he was not paralyzed. A sympathetic jury believed plaintiff's phy-

sicians and gave a judgment of \$15,000, which was paid by the company. Some months afterwards plaintiff was seen in the back yard of his house chasing stray chickens off his premises.

Another case was that of injury to an engineer in East Texas in a collision. The usual claim, "spinal-nervous injury," was made, which was supported by the usual medical testimony. The jury awarded him \$8,000 and very soon after the money was paid he actively engaged in business, and has ever since enjoyed good health.

A freight conductor who was injured in East Texas in 1902 claimed to have sustained an injury to his nervous system, and received in involuntary settlement \$1,850. The following year he was again injured and his nervous system was again deranged; he also alleged that his hearing was greatly impaired. In support of these claims he furnished certificates of several physicians. The company paid him \$2,300 and a few months after this he entered the service of another company in the eastern part of the state as conductor of a construction train.

In the spring of 1904 this same man entered the service of a railroad company in the northern part of the state as switchman, and was again injured, this time claiming that the hand-hold on a freight car had pulled loose, allowing him to fall to the ground, striking his back, with result that his nervous system was again shattered.

An investigation of his former history showed that some four years before he had sued a railroad company for damages for injuries sustained by reason of a fall from a freight car on account of alleged defective hand-hold. The injuries complained of in the petition were "shattering of the nervous system and loss of manhood." The company settled with him and his attorneys for \$800 and he left the service. In view of this fact the last company refused to make any payment for the injuries received, and a suit was instituted. The suit was continued several times, and it was ascertained that while the suit was pending he engaged in the railroad service at another point in the state, and his nervous system was again ruined, and his manhood again lost in another hand-hold accident, this being the third accident of that character in which the nervous system of this unfortunate man had been wrecked.

Another case was that of a passenger who claimed that in the spring of 1903 he was injured by slipping on a banana peel which had been carelessly left in one of the coaches, the result of which

was injury to the "spine." This claim was declined by the company and a suit was instituted. Investigation of the claimant's history showed that some three years before he had a suit against another railroad for injuries alleged to have been received in a collision. The jury awarded a verdict of \$2,500. While the motion for a new trial was pending the plaintiff, believing himself secure from observation, abandoned the use of his crutches, and was seen running to catch a train at the station not far from the place where the suit was pending. When these facts were brought to the attention of the court a new trial was granted.

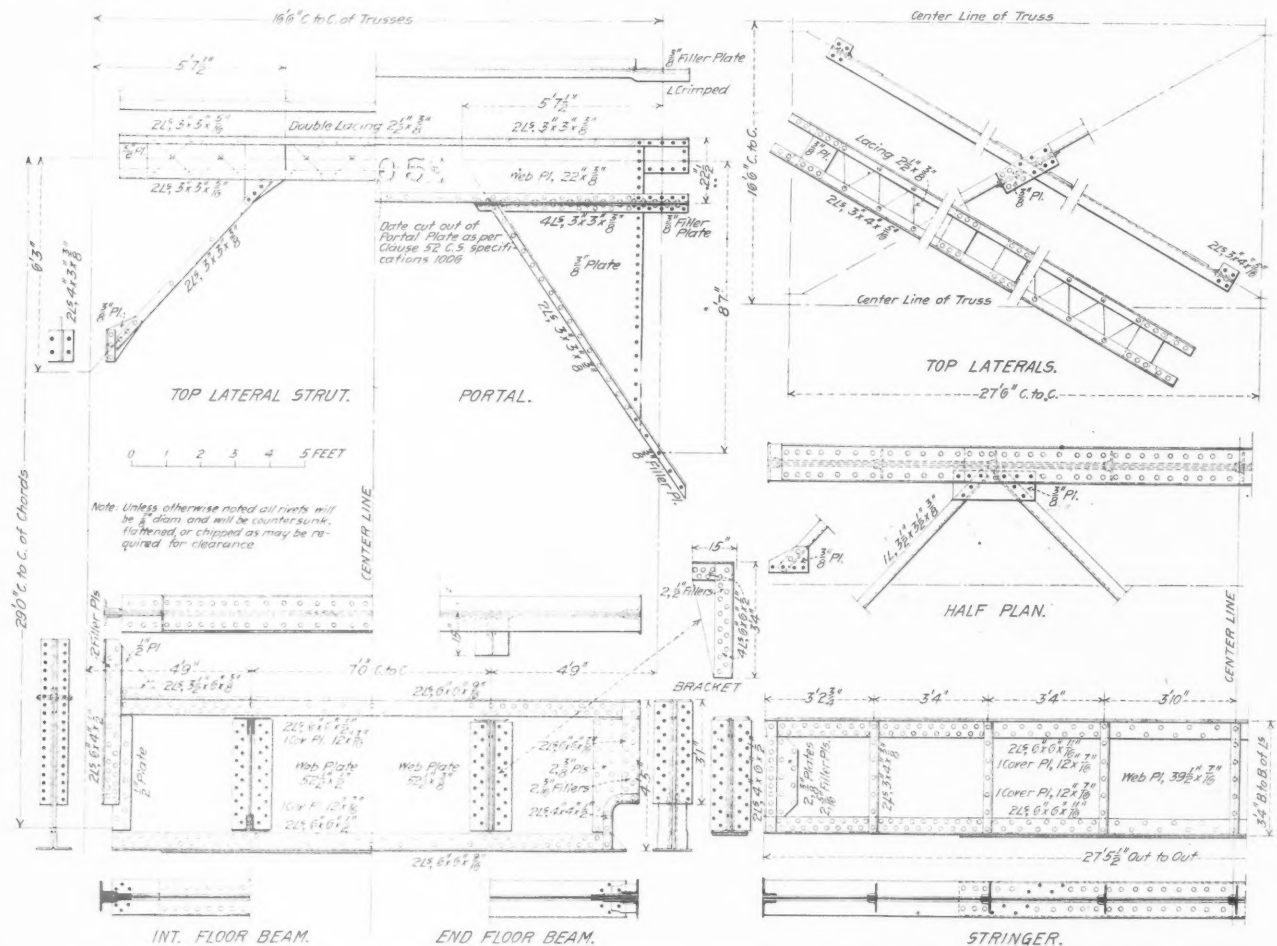
While the banana suit was pending the plaintiff moved into a remote part of the state and went into hiding. He was traced and found hard at work as a fireman at a cotton gin, his duties requiring the exercise of all his muscular powers. It was also found that after the banana peel accident he had made application to an insurance company and represented to it that he was in good health, a statement which was corroborated by the examining physician of the insurance company. The testimony of witnesses to these facts was procured, and upon seeing the depositions on file the suit was dismissed.

I will mention but one other case which, although like most of the others, is rather remarkable in one respect: The sufferer in this instance was a brakeman who claimed to have been injured in a derailment on one of the lines leading out of Houston. The usual claim of injury to the "spine" and nervous system was made, also inability to perform manual labor—all of which was supported by medical evidence. The company paid in settlement \$4,500 after suit had been instituted. Within three months from the payment of the money this physical wreck took the first prize in a cattle roping contest held in one of the cities in North Texas. I believe that the record shows that he roped, threw and tied a steer in 27.5 seconds.

#### Standard Bridges on the Harriman Lines.\*

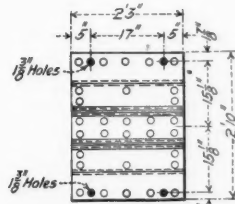
The accompanying drawings show all the details of the common standard 110-ft. through riveted truss bridges used by the Harriman Lines. They are essentially similar in all respects to the 100-ft. span shown July 28, and an extended description is not necessary. The estimated weight of one span complete is 185,000 lbs.

\*Previous articles appeared in the *Railroad Gazette*, March 17, 24, 31, April 7, 14, 21, 28, and July 28.

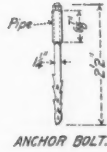


Details of Floor System and Portal Bracing for 110-ft. Riveted Through Truss—Common Standard, Harriman Lines.

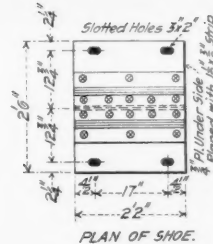




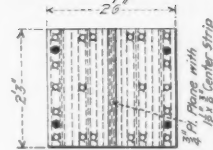
PLAN OF SHOE.



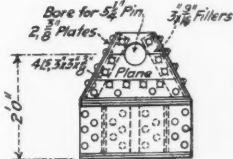
ANCHOR BOLT.



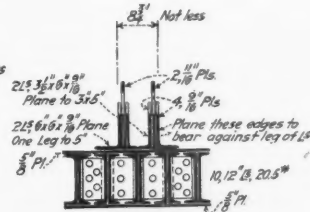
PLAN OF SHOE.



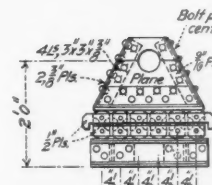
PLAN OF WALL PLATE.



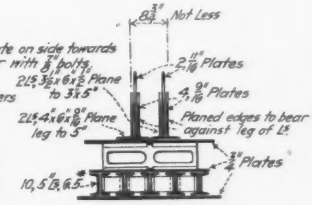
SIDE ELEVATION.



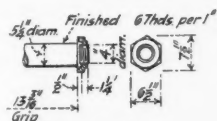
SECTION.



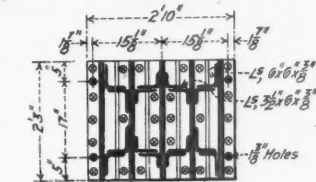
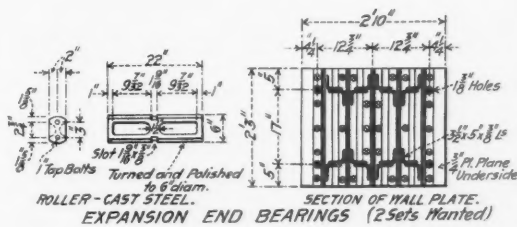
SIDE ELEVATION.



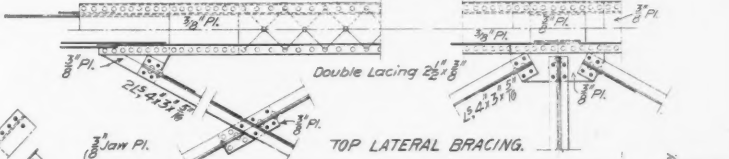
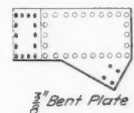
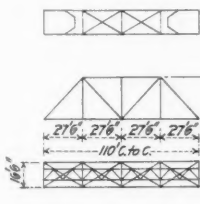
SECTION.



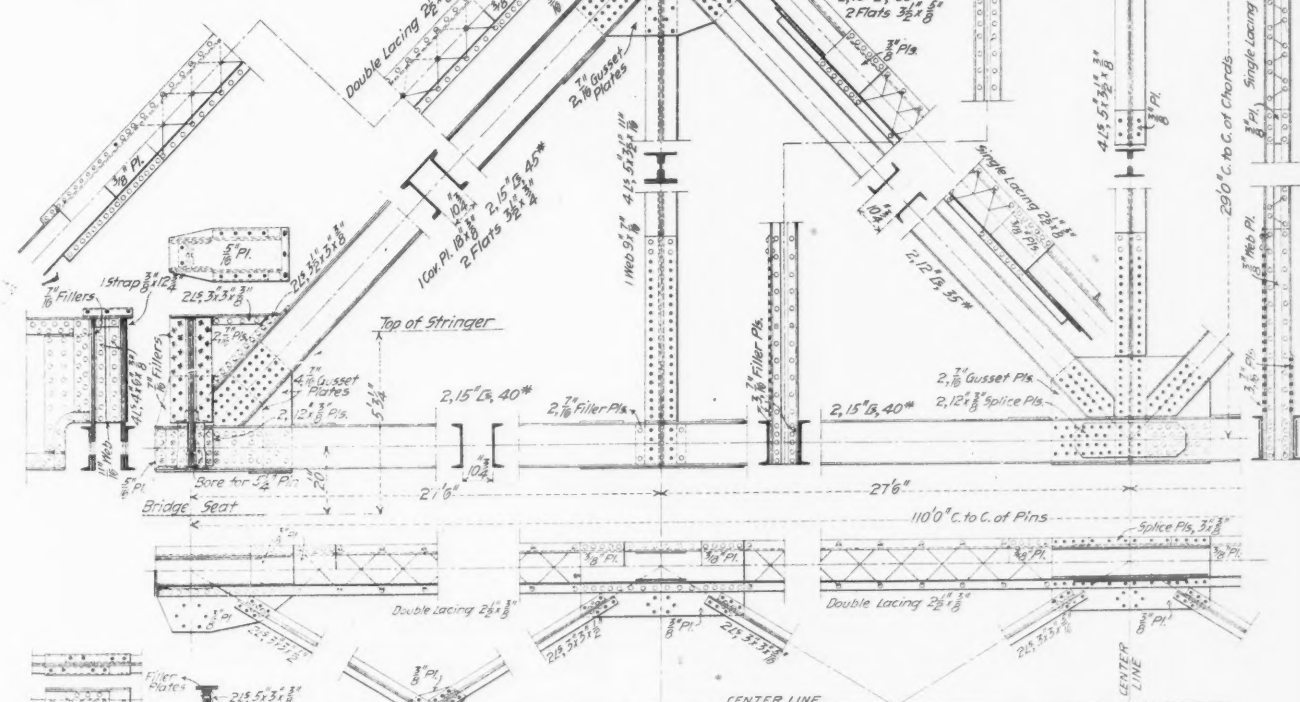
END PIN WITH LOMAS NUT.

FIXED END BEARINGS.  
(2 Sets Wanted)

EXPANSION END BEARINGS (2 Sets Wanted)



TOP LATERAL BRACING.



STRINGER ATTACHMENT.

BOTTOM LATERAL BRACING.

Note: Unless otherwise noted all rivets will be 7/8" diam and will be countersunk, flattened or chipped as may be required for clearance.

Details of Side Trusses and End Bearings for 110-ft. Riveted Through Truss—Common Standard, Harriman Lines.

## Street Railroad Statistics for 1904.

The following is an abstract of statistics of street and inter-urban (including elevated) railroads in the United States, taken from the statistical tables prepared by the *Street Railway Journal*:

For the sake of brevity, only the leading states in each group are named. The New England group in the original embraced the six New England states. The Eastern states were New York, New Jersey, Pennsylvania, Delaware, District of Columbia, Maryland, Virginia and West Virginia. The Central states were Michigan, Ohio, Indiana, Kentucky, Wisconsin, Illinois, Minnesota, Iowa and Missouri. The Southern states were the Carolinas, Georgia, Florida, Alabama, Mississippi, Tennessee, Louisiana and Arkansas, and the Western states were the Dakotas, Nebraska, Nevada, Kansas, Indian Territory, Oklahoma, Texas, Colorado, Montana, New Mexico, Idaho, Utah, Washington, Oregon, California and Arizona.

It will be seen that the Central states have the most electric mileage and the Southern states the least. Of the individual states, Ohio leads, with 3,181 miles; New York is second, with 3,175, and Pennsylvania, with 3,142, is third. Each of these states has more electric mileage than the aggregate of the entire western group of 17 states and territories. Except for California, none of this western group has as much as 350 miles, and only seven of the 17 have as much as 100 miles. Every state and territory is now represented, although in 1903 South Dakota, Nevada and New Mexico had no electric mileage. South Dakota only had four miles in 1904, and

## The Cost of Locomotive Operation.

## IX.

BY GEORGE R. HENDERSON.

(Continued from page 68.)

## LUBRICANTS.

The cost of lubricating locomotives is usually not over 1 per cent. of the locomotive expenses, but nevertheless it generally receives as much attention as the cost of fuel—and sometimes a great deal more. When we consider that the latter (fuel) ordinarily runs into expense 30 or 40 times as fast as oil, there seems to be little reason for this anomalous fact unless it be the peculiar conditions under which lubricants are purchased. Very often there is an agreement with the oil company that lubrication will be effected for a specified figure, and whatever is used over that amount (per engine mile) is supplied free of cost—that is the extra cost as represented by the excess of oil used is refunded to the railroad when the annual settlement is made. At first sight this would seem to minimize the anxiety to make a *good oil record*, but the incentive lies in the fact that when the contract is renewed in one, two or five years time, if the refunded amounts have been large the unit price is increased.

As an illustration: A certain railroad was working under a

STREET AND ELEVATED RAILROAD MILEAGE, CARS, AND CAPITALIZATION, 1904.

States.	No. of roads, 1904.	Track mileage.				Grip cars and locomotives				Capital stock.		Funded debt.	
		Electric roads. 1904.	1903.	Cable, steam and horse 1904.	1903.	Motor cars. 1904.	1903.	1904.	1903.	1904.	1903.		
New England States.													
Massachusetts .....	73	2,734	2,621	...	...	7,305	7,203	.....	.....	\$90,339,065	\$88,708,718	\$44,061,000	\$43,744,000
Total .....	149	4,606	4,410	3	3	10,495	10,188	.....	.....	150,773,018	146,369,821	103,950,405	101,110,300
Eastern States.													
New York .....	106	3,192	3,175	137	159	12,013	11,788	34	122	336,032,395	324,496,117	299,637,590	298,226,060
New Jersey .....	35	1,108	1,025	8	8	2,012	1,939	2	28	87,828,290	86,089,160	78,477,600	74,836,090
Pennsylvania .....	124	3,319	3,142	..	..	7,024	7,298	..	..	231,355,495	224,518,826	163,117,714	153,177,559
Total .....	318	9,156	8,840	145	169	24,851	24,633	36	150	743,568,286	719,517,409	657,775,404	640,791,768
Central States.													
Michigan .....	30	1,203	1,199	..	..	1,832	1,796	..	..	39,987,000	39,920,000	44,139,500	42,474,000
Ohio .....	98	3,437	3,181	2	6	4,544	4,499	..	4	178,959,000	174,910,550	106,434,500	95,182,100
Indiana .....	45	1,360	1,197	7	7	1,389	1,246	..	..	54,532,500	48,605,900	50,182,500	42,189,000
Illinois .....	55	1,986	2,080	97	117	4,571	4,378	470	467	174,059,650	168,807,910	112,639,500	107,724,000
Total .....	313	10,060	10,728	144	168	17,665	17,215	657	658	595,615,545	571,070,355	457,373,850	425,955,156
Southern States.													
Georgia .....	13	356	338	7	6	468	459	..	..	19,588,000	19,441,000	16,988,000	16,793,000
Tennessee .....	10	292	285	7	7	498	456	14	13	9,778,500	9,674,500	10,460,500	9,708,625
Total .....	83	1,495	1,408	48	56	2,556	2,382	20	18	90,293,500	88,111,300	81,765,500	78,020,125
Western States.													
California .....	38	1,668	1,321	151	150	1,545	1,429	527	595	92,761,750	86,560,400	79,498,000	78,042,000
Texas .....	19	400	349	11	9	656	562	..	..	15,884,500	15,807,500	14,693,000	11,979,000
Total .....	130	3,563	3,036	299	306	4,058	3,723	644	721	181,321,463	167,719,413	154,655,000	143,587,000
Total, United States...	993	29,548	27,754	639	702	59,625	58,141	1,357	1,547	\$1,761,571,812	\$1,692,788,298	\$1,455,520,159	\$1,389,464,349

Nevada five miles. The nine central states have over seven times as much mileage as the nine southern states.

Of the entire street railroad mileage in the country, 97 per cent. was worked by electricity in 1904, the chief instances of horse, cable or dummy lines being in New York, Chicago and San Francisco. It must be recollected that all the figures given are for track mileage; not for route mileage, which would aggregate considerably less, owing to the prevalence of double track in cities. The average capitalization, total of stocks and bonds, per mile of track throughout the country, was \$108,876; the average capitalization in Massachusetts, where the issuance of securities is closely watched by the railroad commission, was \$49,158. The average capitalization (stocks and funded debt) per mile of track of the steam railroads in the country was approximately \$45,683, in 1903.

The coal shipments of the three principal coal regions of Germany were 3,215,954 ten-ton carloads in the first five months of this year, against 3,364,782 last year. A miners' strike greatly reduced the shipments in the principal region for several weeks, which were but partly made up by increased shipments from another district. In May the shipments were one-sixth greater than last year, and greater than ever before. The iron industry suffered less by the strike than was expected, and the production of pig iron has been about the same as last year. The coal miners estimate that about 4 per cent. more coal and 8 per cent. more coke will be produced in 1905 than in 1904.

guaranteed cost of oil for locomotives at \$1.20 per 1,000 engine miles. The year before the contract expired, owing largely to an increase in the size of locomotives used by liberal purchases of heavier power, the cost (as charged out at the agreed prices) ran in the neighborhood of \$2.00. While the amount necessary to reduce the cost during the life of the contract was promptly forthcoming, the price was raised in the new contract to \$1.82. These statements and documents passing constantly through the hands of the officials are no doubt responsible for the alertness with which oil consumption is watched, as no such arrangement obtains with fuel. In fact, this supervision is carried to such an extreme that at times there is no doubt that a great deal more is expended in fuel and repairs, due to excessive friction and wear, than is saved by economizing in oil; on the other hand there is probably no article used about locomotives that is ordinarily handled as wastefully and ignorantly as lubricating oil, as is seen by the inspection of almost any round-house or standing yard.

*Quality.*—As in other articles of commerce, all kinds of oil can be obtained, although at the present time the supply has narrowed nearly down to one make of locomotive lubricant. We do not mean, of course, one grade of oil for different purposes, journals and cylinders for instance, but that the supply comes from one firm. Some years ago when competition existed it was customary for railroads to purchase oil on their own specifications, but there is comparatively little of this done at the present time.

Ordinarily a high priced oil will afford better lubrication than a low priced oil, and if all the material went where it was intended



to go, there might even be economy in using the high grade and more expensive article, but when we contemplate the manner in which locomotives are often oiled, and consider what proportion goes upon the track, or any place but the journal, the high priced material does not seem so economical. On account of the difficulty of access of many parts of the engine, and the frequent need of oiling moving parts while the locomotive is in motion, by means of a long spout can when lying on the running board, it is not to be wondered at that much is dropped on the roadbed, and this could just as well be a cheap product. These wastes will always be more or less inseparable from locomotive operation, and the recognition of this fact probably accounts for many lines using *car oil* on locomotive bearings.

Usually the locomotive lubricants consist of four distinct grades, at about the following prices:

Cylinder oil .....	48 cents per gallon.
Engine oil .....	28 " " "
Car oil .....	18 " " "
Grease .....	4 " " pound.

Of course, these are liable to fluctuation. Besides a saving of two cents a gallon can usually be made by taking the oils in tank car lots, thereby saving the cost of the barrel, generally \$1, holding 50 gallons.

The cylinder oil is compounded to stand high pressure steam temperatures, and is supposed to remain stable up to 600 deg. Fahrenheit. It is not suitable for journals, although it is very difficult to prevent the men applying it to bearings when they run hot. It is apt to cause hot driving boxes by clogging up the oil passages, as it will not run when cold, and this improper use of a high priced article adds to the expense. Its sole use should be upon the valves and cylinders of the locomotive and air pump.

Engine oil is intended for the journal bearings and all running parts, and car oil for the tender journal boxes. However, some roads, as hinted above, use car oil for freight and switching engines, and *engine oil* for passenger locomotives only, thus saving 10 cents a gallon and keeping down the cost of lubrication accordingly.

Perhaps grease for crank pins, and lately for driving boxes, has done more for the hot box evil than any one thing in locomotive practice. It not only seems to take a great deal less to lubricate the bearings, but there is not the same chance for waste, the material is not thrown all over the wheels by the motion of the rods, and the heating of journals has been greatly reduced. It has been claimed that grease wears the pins and brasses faster than oil, and while this may be really true, it is a fact that there is less heating with the grease, whereas with oil, when the box becomes hot, it has to be reduced and refitted, and one such operation will remove as much brass as will wear off from the use of grease in running a great many miles.

**Loss.**—As above indicated, there is always more or less loss with oil, and it is very difficult to eliminate this feature. As express trains generally make very short stops, it is customary for the engineer to run over one side and the fireman over the other (unless he is engaged in taking water), and the supply is more apt to be liberal than systematic. Then there is a decided tendency, when anything runs hot, to apply cylinder oil, very much greater in cost than the engine oil, and large quantities are so used. Very often the packing (greasy waste) is removed from a journal box, which has been only recently packed, and much oil is thus wasted.

Some lubricators feed very irregularly, perhaps flooding the valves at one time, and allowing them to run dry another. Perhaps the force pump is the most regular of the several devices on the market for the purpose of cylinder lubrication, as this delivers an amount which is constant and determinate. The waste does not occur altogether on the engine, as some oil houses with oil soaked floors will attest. The receipt of oil in tank cars ordinarily stops most of the waste due to leakage, but even here it is necessary to look out for water in the oil. Sometimes it comes over with the compressed air used for elevating from the tank in the basement to the supply faucet, and sometimes with that used to force it quickly out of the tank car into the storage tanks. Modern methods of handling oil, however, have greatly reduced the item of loss in this process, and have also diminished the cost of labor, so that it is perhaps unnecessary to add any appreciable figure to the price of the oil to cover this point.

**Hauling.**—Generally this will add a very small proportionate expense to the cost of the oil. If purchased in barrels of 50 gallons each, the weight per barrel will run about 400 lbs., or one-fifth of a ton. At one-half cent per ton-mile rate of transportation, the barrel would cost therefore  $\frac{1}{10}$  cent per mile, and a 500 mile haul 50 cents. If the average cost of the oil used was 25 cents per gallon, a barrel would be worth \$12.50, or with the haul included \$13, or 26 cents a gallon, 4 per cent. increase for the 500 mile haul, or approximately we may expect an increase in the *actual cost* of 1 per cent. per 100 miles hauled.

If the oil is received in tank cars the car must probably be returned to the point of delivery, in which case the cost of so doing should be added. However, as an approximate figure, it is believed

that above mentioned allowance of 1 per cent. per 100 miles hauled will be ample.

**Quantity.**—If there was no waste, the quantity of oil used would be quite small. At the 1904 meeting of the Master Mechanics Association it was stated by Mr. M. K. Barnum that from tests which he had made he believed that of all the oil applied to locomotive bearings not more than one-tenth part does the actual work of lubrication! However, we will try to determine what amounts could be expected under various circumstances, and first take up cylinder or valve oil.

Naturally, the size of the cylinder and number of strokes should cause an appreciable effect upon the amount needed for lubrication, therefore the larger the cylinder the more oil that would be required. So also if the drivers were smaller and a greater number of strokes of the piston were required in traversing a given distance, the amount of oil would be increased. Thus as an ordinary rule, on account of smaller wheels, freight engines would be expected to use more oil in a given distance than passenger engines with the same size cylinders. It seems probable that the amount of work done by the pistons (outside of that depending upon their size and speed) only slightly affects the oil consumption; that is to say, as much would be required if working at one-quarter as at three-quarters cut-off. It is well-known that the most important time to lubricate the valves and cylinders is while running down grade with the throttle closed, the reason for this being that dry steam acts partly as a lubricant itself, and this is absent when the throttle is closed. Therefore it comes about that locomotive lubricators are adjusted as nearly as possible to give equal feeds whether the throttle valve is open or closed. This would indicate that the "engine mile" is the proper unit for basing the cylinder oil consumption of any particular engine, though as the tonnage hauled depends upon the size of the cylinders the ton-mile unit is satisfactory for comparing engines of different power.

If we simply consider, then, the size of the cylinder, and the class of service in which an engine is working, we can tabulate what might be considered a fair average for an engine to make per pint of valve oil.

Engine.	Service.	Cylinder diameter.	Miles, per pint.
Simple .....	Passenger .....	17 or 18 inch.	150
" .....	Freight .....	17 " 18 "	100
" .....	Passenger .....	19 " 20 "	120
" .....	Freight .....	19 " 20 "	80
" .....	Passenger .....	21 " 22 "	90
" .....	Freight .....	21 " 22 "	60
Compound ...	Passenger .....	16 and 26 inch	110
" .....	Freight .....	16 " 26 "	75
" .....	Passenger .....	17 " 28 "	90
" .....	Freight .....	17 " 28 "	60

Ordinarily only the most careful men will attain these figures, and the poorer ones will fall considerably below them. Thus on a large road in the northwest the month of November, 1899, showed for the divisions using the heavier passenger and freight engines, with 19 and 20-in. cylinders, averages of 63, 82 and 91 miles to a pint respectively for each division, these values being the average of freight and passenger service, and on the divisions using mostly 18 and 19-in. engines 108, 81, 105 and 122 miles to a pint. On a road in the southwest, during May, 1903, on one division we found for 18-in. engines in passenger service from 134 to 142 miles to a pint for 20-in. engines, 72 to 105 miles, and for 17 and 28-in. compounds from 50 to 123 miles per pint of oil. In freight service on the same division, the mileage ran for 18-in. engines 63 to 96 miles, and for 17 and 28-in. compounds from 25 to 81 miles per pint of cylinder oil. These figures give an idea of the irregular manner in which the consumption of oil varies with different men, and the very large effect of their "personal equation." It is quite a common thing to find engineers with absolutely no idea of the amount of oil that should be fed to an engine, and allowing the lubricator to work six or eight times as fast as it properly should, and these circumstances must be taken into account when estimating the probable average consumption.

The amount of engine oil (for bearings) should properly bear some relation to the work performed, as when working hard there is no doubt that more oil is needed, but a distinction like this is very hard to make. The quantity needed by engines of various sizes and types should undoubtedly depend upon the size of the cylinders and the number of journals, as well as the weight of the engine. But these, in a measure at least, are dependent largely upon the size of the cylinder. The number of revolutions is governed by the size of the wheel, and in going a given distance will ordinarily be greater for freight than for passenger locomotives. As there is a great uncertainty how much engine or lubricating oil will be used in any case, we therefore observe that we are practically able to use the same basis for estimates as we did with cylinder oil, viz., cylinder diameter and class of service.

By comparing different reports we find that there is ordinarily four times as much engine oil as valve oil used in a given distance, or the mileage to a pint is one-fourth that of cylinder oil. In freight service it may run nearer to one-third. Thus on the division above

cited the averages for several groups or runs of passenger engines were:

Valve oil.	Miles to a Pint of—	Engine oil.
85	.....	19
71	.....	19
102	.....	30
120	.....	27

and for freight locomotives,

Valve oil.	Miles to a Pint of—	Engine oil.
79	.....	24
35	.....	20
80	.....	33
46	.....	14
39	.....	12
33	.....	11
66	.....	20

Some of these values are extremely low; these were taken from the "pool freights," which generally show less economy in lubrication, as in other supply charges.

If we take the northwestern road by divisions (passenger and freight not separated) we have:

Valve oil.	Miles to a Pint of—	Engine oil.
91	.....	27
82	.....	21
63	.....	23
108	.....	37
81	.....	30
99	.....	25
105	.....	37
93	.....	34
91	.....	38
122	.....	51

Showing that our assumption of four times the amount of valve oil in passenger service and three times in freight, for the quantity of engine oil, is sufficiently close.

As we have stated above, grease is now quite commonly used as a partial substitute for engine oil. So far, it has only been generally applied to crank pins and driving and truck journals. For

of grade apparently are very slight upon oil consumption, as it requires about as much when running down hill as up grade.

The temperature has, no doubt, considerable influence upon the conditions of lubrication, and it is usual to use summer and winter grades of lubricating oil—the latter is much thinner, and if applied in warm weather will give trouble by running off, and also not providing sufficient viscosity for the separation of bearing and journal. These results, however, are too indefinite to embody them in estimates of cost.

(To be continued.)

#### Standard Length of Brake Beams.

At the last convention of the Air Brake Association a recommendation was adopted "That the length of brake beams for standard gage cars be not less than 59½ in. and not more than 60 in. from center to center of brake heads." This recommendation was considered by the committee on Standards and Recommended Practice of the Master Car Builders' Association and embodied in its report to the Association at the Manhattan Beach convention last month with the recommendation that the present standard of 60½ in. be changed accordingly. Along with other sections of the report it was referred to letter ballot for adoption by the M. C. B. Association. That there is some question about the advisability of making the proposed change is evidenced by the fact that the Chicago Railway Equipment Company is now sending out to the railroads a circular letter and a drawing showing the relative positions of the brake shoes on the wheel treads with heads mounted 59¼, 60, 60¼ and 60½-in. centers. The following is an extract from the letter accompanying the drawing which is also reproduced herewith:

"It will be noticed that 60½ in. is the most desirable position, if maintained. One of the real difficulties is that many brake beams are over 60½-in. centers: again the method of hanging—whether

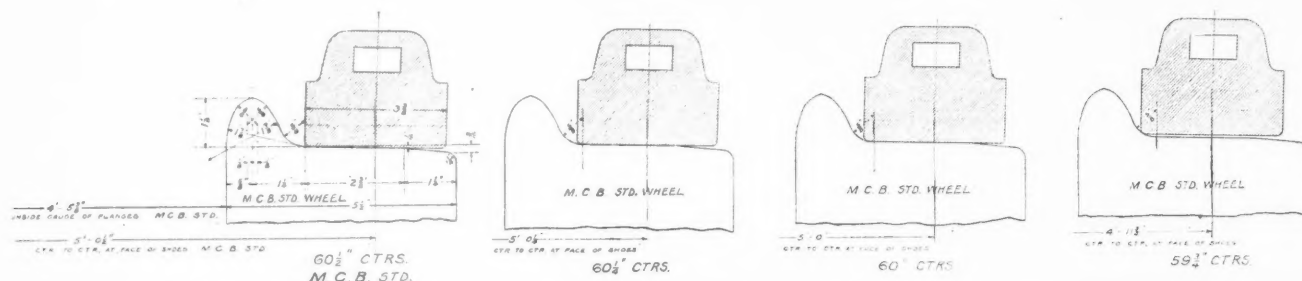


Diagram Showing Position of Brake Shoe on Wheel Tread with Different Lengths of Brake Beams.

these purposes it has been eminently satisfactory, and has reduced the cost of lubrication. In rod cups one filling will run for 500 miles or more. Consolidations have been operated using only one-eighth pound of grease for 100 miles, a service which formerly required a pint of oil. As for equal weights the costs of grease and engine oil are generally the same, the apparent saving is great. In driving boxes it has been found that 2½ ounces per 1,000 miles per box have been sufficient, and 1½ ounces for truck boxes, the cost being about one-tenth that of oil, and with less trouble from heating.

If we take the prices for oil given previously, we can work up the estimated cost per engine mile, either by assuming that the journal lubrication is entirely of engine oil or so much grease that it cuts the cost of journal lubrication in half, and obtain the following totals for the classes of engines just given.

Estimated cost for cylinder and engine oil per 1,000 miles, taking cylinder oil at 48 cents and engine oil at 28 cents per gallon, and allowing four gallons of the latter to one of the former in passenger service, and three to one in freight, also allowing for use of grease at half rate of engine oil.

Engine.	Service.	Cylinder diam.	Without Grease.	With Grease.
Simple....	Passenger.....	17 or 18 inch.	\$1.31	\$0.85
"	Freight.....	17 " 18 "	1.65	1.12
"	Passenger.....	19 " 20 "	1.67	1.08
"	Freight.....	19 " 20 "	2.07	1.41
"	Passenger.....	21 " 22 "	2.23	1.45
"	Freight.....	21 " 22 "	2.68	1.84
Compound..	Passenger.....	16 and 26 "	1.82	1.18
"	Freight.....	16 " 26 "	2.19	1.39
"	Passenger.....	17 " 28 "	2.23	1.45
"	Freight.....	17 " 28 "	2.68	1.84

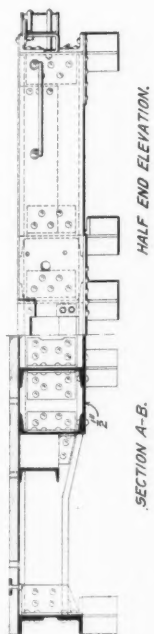
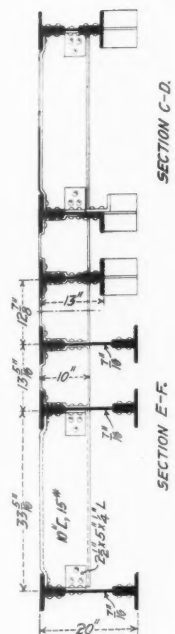
These figures may be taken as a guide, but not as absolutely correct, as conditions may vary them considerably. Thus it was found that the fast mail on one of our principal roads used three times as much oil as the average of the passenger trains over the division, the engineer being particularly anxious that no delay should occur due to hot bearings. It is likely, however, that he used amounts greatly in excess of his actual needs. This would indicate that high-speed trains are likely to use more oil than slow-speed trains for the same amount of power developed. The effects

hung 'outside' from car body, or 'inside' from truck, makes a great deal of difference. The usual variation allowed by railroads, in specifying length of brake beams, is ¼-in. either way. This variation is none too much for the ordinary manufacture, rough castings, etc., but it does allow brake beams to be made 60¼ in., which is not desirable. The minimum proposed to be adopted, 59¼ in., crowds the shoes too much into the flange of wheel (see drawing). If 60¼ in. should be adopted as standard, with 60 in. minimum and 60½ in. maximum, we believe the railroads will then get what is most desirable, so far as the length of brake beam is concerned. If a brake beam is hung *exactly* 60½ in., it will be noticed that the distance between the inner edge of shoe and flange of wheel is not sufficient to allow the beam (when properly hung) to swing laterally enough to bring the opposite shoe outside of the tread. This condition will be still better insured with 60¼ in. as standard, with 60½ in. the maximum and 60 in. the minimum."

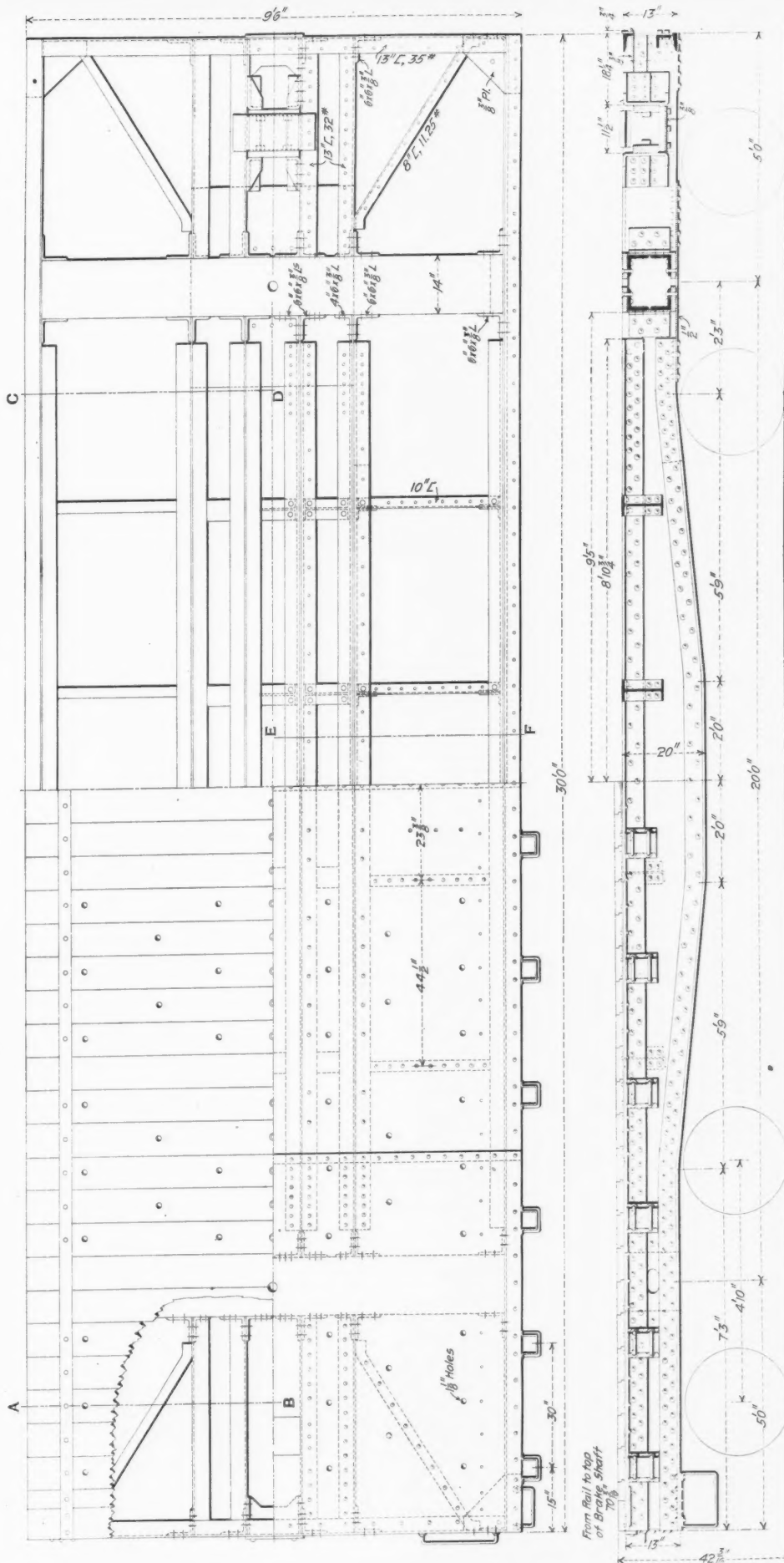
#### 150,000-lb. Flat Cars for the Pittsburg & Lake Erie.

The Pittsburg & Lake Erie has recently built at its McKees Rocks shops two steel underframe flat cars which have a capacity of 150,000 lbs. They are intended for carrying heavy irregular castings, large ingots, etc., in and around the mill districts of Pittsburg. As will be seen from the accompanying drawings there have been embodied in their design a number of radical departures from usual practice in steel car building. No attempt has been made to simply re-inforce a 100,000-lb. underframe to give additional strength, but the cars have been built uniformly heavy and strong in every part. The weight is in consequence quite high for so short a car, being 48,200 lbs. as against 47,500 lbs. for the 60-ton flat car 40 ft. long built about two years ago for the General Electric Company by the American Car & Foundry Company.

The underframe consists of continuous fish-bellied side sills, heavy box section bolsters, 13-in. channel end sills, four center sills between the bolsters, and four draft sills at each end between the bolsters and the ends, the whole being covered with a ¼-in. floor



HALF END ELEVATION.



Plan, Elevations and Sections of 150,000-lb. Flat Car for the Pittsburgh & Lake Erie.





plate on which the plank floor is laid. The side sills are 20 in. deep at the center and 13 in. deep at the ends, and are built up from a  $\frac{7}{16}$ -in. web plate and four 5-in. x  $3\frac{1}{2}$ -in. x  $\frac{5}{8}$ -in. angles. The ends of the web plates are turned in and riveted to the back of the end sill channel webs and floor gusset plates have also been used to keep the corners square.

The bolsters are particularly heavy, as will be seen from the detail drawing. They are built of solid box section with  $1\frac{1}{4}$ -in. top and bottom plates,  $\frac{1}{2}$ -in. side plates and 5-in. x 5-in. x  $\frac{5}{8}$ -in. angles in each corner. At the center they are 13 in. deep tapering to 10 in. at the ends, where they are secured to the side sills with two heavy corner angles and a shelf angle underneath. The four sills between the bolsters and end sills, two of which are draft sills, are 13-in., 32-lb. channels riveted in with the usual angle connections consisting of short lengths of 6-in. x 6-in. x  $\frac{3}{8}$ -in. angles. An 8-in. channel diagonal brace ends in from near the extremities of the end sills to the center longitudinal sills just in front of the bolster.

The four center sills are grouped close together and are not continuous over the bolsters. They are built up with the same I section as the side sills, but the angle flanges end  $6\frac{1}{4}$  in. short of the back face of the bolsters. The web plates are brought up tight and riveted between two 6-in. x 6-in. x  $\frac{3}{8}$ -in. angles. At this point the principal stress is vertical shear and the webs being  $\frac{7}{16}$  in. thick by 13 in. deep have ample strength to resist. A  $\frac{1}{2}$ -in. plate 48 in. long by  $39\frac{1}{2}$  in. wide is riveted under the bottom of the bolster and the longitudinal sills to tie the whole structure together at this vital point. For the cross-bearers, of which there are four between the bolsters, 10-in. channels are used between the side sills and outside center sills and I-beam sections as fillers between the four center sills. The  $2\frac{1}{4}$ -in. deck planking is secured to the steel floor by three  $\frac{1}{2}$ -in. x 3-in. strips of wrought iron running the length of the car bedded flush with the top surface and fastened with  $\frac{3}{4}$ -in. countersunk head bolts. At a large number of places in the floor  $1\frac{1}{2}$ -in. holes have been drilled to allow for securing the load on the car and stake pockets are also provided.

The trucks used under these cars are of extra heavy design. They are of the diamond arch-bar type with special cast-steel bolsters. The top arch-bars are  $1\frac{3}{4}$  in. x 6 in., the inverted arch-bars  $1\frac{5}{8}$  in. x 6 in. with gibbed ends, and the bottom tie bars are  $\frac{7}{8}$  in. x 6 in. The column bolts are 2 in. in diameter and the box bolts are  $1\frac{1}{2}$  in. in diameter. Four double-coil springs  $5\frac{1}{2}$  in. outside diameter and 6 in. of  $1\frac{1}{4}$ -in. and  $\frac{3}{4}$ -in. rods are used under each end of the bolster. The journals are  $6\frac{3}{4}$  in. x 11 in. and the wheels are 26-in., steel-tired.

We are indebted to Mr. L. H. Turner, Superintendent of Motive Power of the Pittsburgh & Lake Erie, for the drawings and information. The cars were designed under his direction by Mr. W. P. Richardson, Mechanical Engineer of the road.

#### Reinforced Concrete.\*

The justification of the use of reinforced concrete is usually based on some one or all of three conditions. First, under some circumstances it is actually more economical than any other rational method of construction. Secondly, there are cases where it is almost the only practicable method of construction. Thirdly, there are cases where it is simply preferable. It is not very easy to demonstrate the economy of this method except by comparative cost in individual cases, but an approach to a systematic comparison may be made as follows: A cubic foot of steel weighs 490 pounds. Assume as an average price that it can be bought and placed for 4.5 cents per pound. The steel will therefore cost \$22.05 per cubic foot. On the basis that concrete may be placed for \$6.00 per cubic yard, the concrete will cost 22 cents per cubic foot, which is 1 per cent. of the cost of the steel. Therefore, on this basis, if it is necessary to use as reinforcement an amount of steel whose volume is in excess of 1 per cent. of the additional concrete which would do the same work, there is no economy in the reinforcement, even though the reinforcement is justified on account of the other considerations. Assuming 500 pounds per square inch as the working compressive strength of concrete, and 16,000 pounds as the permissible stress in steel, it requires 3.125 per cent. of steel to furnish the same compressive strength as concrete. On the above basis of cost, the compression is evidently obtained much more cheaply in concrete than in steel—in fact, at less than one-third of the cost. On the other hand, even if we allow 50 pounds per square inch tension in the concrete and 16,000 pounds in the steel, it only requires 0.31 per cent. of steel to furnish the same strength as the concrete, which shows that, no matter what may be the variation in the comparative price of concrete and steel, steel always furnishes tension at a far cheaper price than concrete, on the above basis, at less than one-third of the cost. The practical meaning of this is, on the one hand, that a beam composed wholly of concrete is usually inadvisable, since its low tensile strength makes it un-

economical, if not actually impracticable, for it may be readily shown that, beyond a comparatively short span, a concrete beam will not support its own weight. On the other hand, on account of the cheaper compressive stress furnished by concrete, an all-steel beam is not so economical as a beam in which the concrete furnishes the compressive stress and the steel furnishes the tensile stress. This statement has been very frequently verified when comparing the cost of the construction of floors designed by using steel I-beams supporting a fireproof concrete floor, and that of a concrete floor having a similar floor slab but making the beams as T-beams of reinforced concrete.

Another instance of the actual economy of this method of construction is furnished by a recent design for a retaining wall. The wall was to be 14 feet in height and the design was for a skeleton reinforced concrete construction. It has a base plate of the requisite width, so that the center of pressure of the base will be properly located. Buttresses which run back into the embankment at proper intervals are connected with the base plate, while the face of the wall between the buttresses has only such thickness as is required to withstand the bursting pressure developed between each pair of buttresses. The whole structure is reinforced with steel so as to take up all the tensile stress which may be developed in any part of the wall. The cross-section of this wall has an average value of 25.44 square feet, which is the equivalent of 25.44 cubic feet per linear foot of wall. A wall of rubble masonry was designed by well-known railroad engineers for this same location. This wall had a cross-section of 80.45 square feet. On the basis of 25 cents per cubic foot, or \$6.75 per cubic yard, each linear foot of the rubble wall would cost \$20.12. Of course, the unit price of the concrete wall is considerably higher, but its volume is but little over 30 per cent. of the volume of the stone wall. In this particular case an estimate for this wall at the rate of 40 cents per cubic foot as measured in place was obtained from a reliable contractor, the estimate including the steel and all other items of construction except mere excavation, which was not included in the first estimate. The concrete wall would therefore cost \$10.16 per linear foot, which is practically *one-half* of that of the stone wall. Many other illustrations could be given where reinforced concrete construction is the cheapest that gives a permanent structure.

As an instance of the second class of structures, viz., those in which reinforced concrete is almost the only practicable method of construction, the following case is given. It was required to construct a retaining wall with a height of 36 feet above the rails of a sunken track where the right-of-way was absolutely limited to a width that gave 10 feet from the right-of-way line to the clearance line for the tracks. The wall was designed to have its base 42 feet below the top. Of course, 10 feet is too small a base for a 42-foot retaining wall. The only possible solution appeared to be some provision by which the toe of the wall could extend underneath the track. Of course, such a construction in stone masonry or even in plain concrete would be an utter impossibility, since it would inevitably break at the angle at the base. A structure of concrete and steel in which the transverse stress at the lower angle of the wall is resisted by the horizontal steel bars in the base, with the very considerable pressure of the earth on the base plate behind the face wall, accomplished all that is desired. The resultant line of pressure is within the middle third of the base, while the maximum intensity of pressure on the subsoil was computed to be about 6,400 pounds per square foot. As the subsoil is a very firm gravel this pressure is a perfectly safe one, but if it had been found that the soil was less reliable it would have been a comparatively simple matter to enlarge the foundation as much as necessary. Of course, the conditions of this problem were very peculiar and unusual, and it illustrates what can be done under such circumstances.

The *Engineering News* recently published an interesting account of a wall constructed by the Great Northern Railway Company at Seattle, Washington. The wall is over 40 feet from base to top at the highest point, varying from this maximum to nearly zero. The economy of the design in comparison with a wall in plain concrete was computed. There was shown to be a saving of 20.4 per cent. for a wall 10 feet high and of 45 per cent. for a wall 40 feet high. But in this case there was no question of limitation of the base of the footing behind the face of the wall, and therefore no necessity of extending the toe of the wall under the tracks.

The third class of structures, viz., those in which reinforced concrete is simply preferable, may be illustrated by the very simple case of fireproof floors. One of the compensations of the Baltimore fire was its demonstration of the fact that a concrete floor when properly made approaches the ideal by being more nearly absolutely fireproof than any other flooring material. It has been frequently stated that since concrete is formed by the crystallization of a compound containing water, it only requires heat to drive off the water and render the whole structure worthless from a structural standpoint. In one sense this is true, provided the heat is sufficient; but the Baltimore fire proved that even with the very excessive degree of heat which was developed during that fire, the effect of such heat on a concrete floor was merely to calcine the

\*Extract from a paper by Walter Loring Webb, read before the Engineers' Club of Philadelphia, March 18, 1905.

lower layer of concrete to a depth varying from  $\frac{1}{2}$  inch to 1 inch. After such calcination occurred, this layer of heat-resisting material proved to be such a thorough protection that the concrete above it was uninjured, and considering that the concrete that lies above the axis of the reinforcement is the only portion which is considered in calculating the strength, and also considering that an inch or two of concrete is always placed below the steel reinforcement, even the destruction of an inch of concrete on the lower side of a concrete slab will not impair its structural strength. After such a fire, the injured material may be scraped off, so far as it is loose, and another protecting layer, which is only put on for protection and not for structural strength, can be added.

Another very satisfactory use of reinforced concrete is in the construction of roof slabs for fireproof buildings. The author has recently constructed a factory and boiler house entirely of concrete. Even the side walls were built of hollow concrete blocks. The floors are of concrete, the roof slab of concrete, and even the stairs are made of concrete. The boiler house has a roof with a clear span of 30 feet formed by placing a 4-inch slab on concrete beams stretching across the span of 30 feet. The beams have a depth of  $13\frac{1}{2}$  inches under the slab and a width of  $7\frac{3}{4}$  inches. They are spaced 6 feet  $2\frac{1}{2}$  inches apart. The slab is reinforced by  $\frac{1}{2}$ -inch bars spaced 16 inches apart. Only a few weeks after the roof was in place and before the concrete had attained anything like its full strength a very unexpected and unintentional test of the roof occurred. A steel stack was being erected, the stack being put into place by means of a derrick. The derrick broke, a large gin-pole was broken in three pieces, the stack crumpled up, and the whole mass of wreckage fell on this roof. No injury whatsoever was done to the roof.

A great number of long sidings have been built within the past year along the Siberian Railroad, and it is said that military trains are no longer held excessive periods to await trains in the other direction.

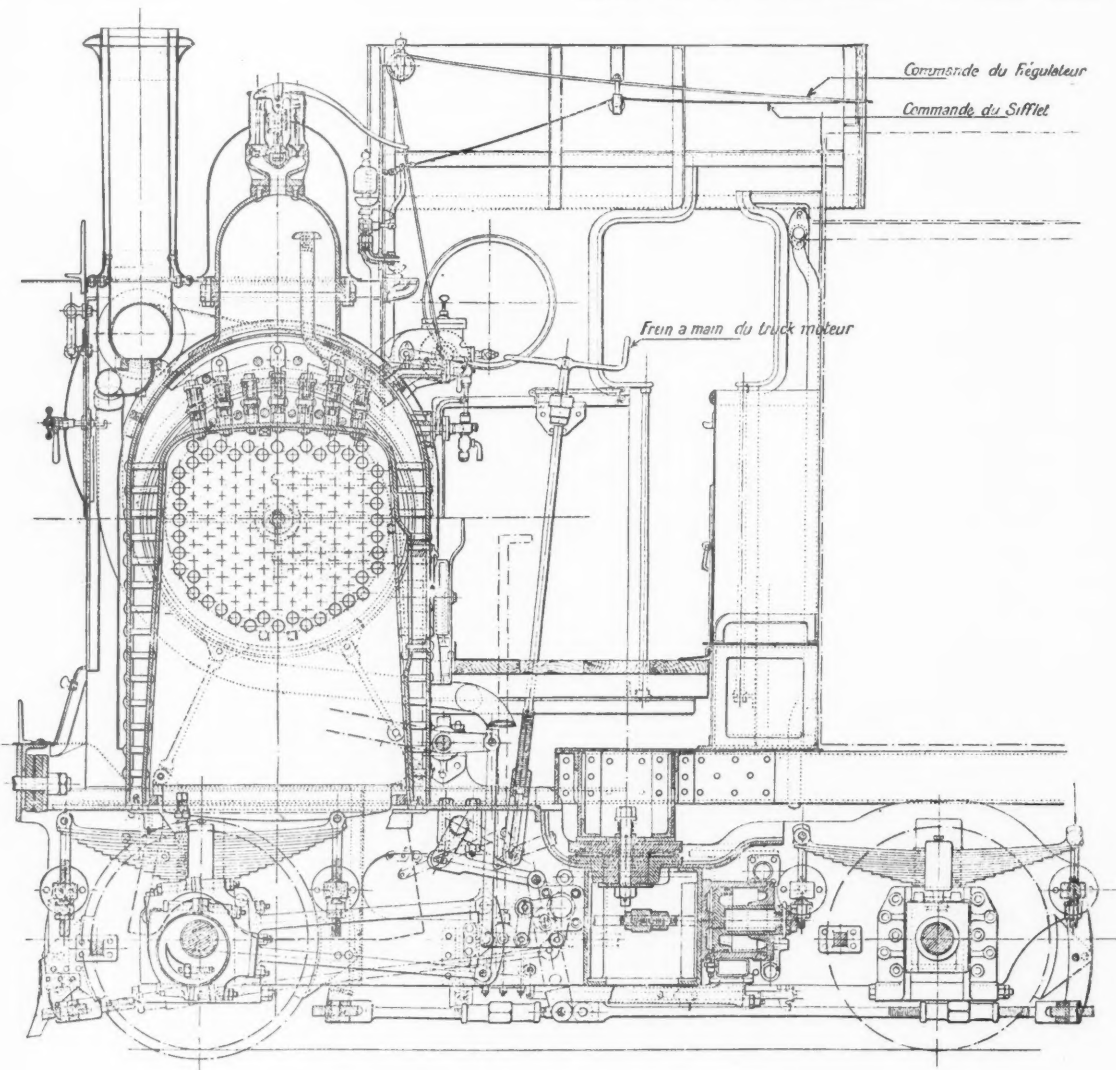
#### English Motor Cars.

The *Revue Générale des Chemins de Fer* recently published a brief review of the motor cars that have been introduced upon the English railways. All of them are driven by steam with the exception of three, one of which belongs to the Great Northern and two to the North Eastern. The Great Northern car has a gasoline motor capable of developing 72 horsepower. It is not yet in regular service though it has been on trial for a number of months.

The North Eastern cars also use gasoline in an engine that drives a generator supplying current to tramway motors mounted on the trucks. They are in regular service but the consumption of fuel is excessive and as this fuel is expensive the cost per mile for oil alone is 9.66 cents. Since a locomotive on the light railways rarely burns more than 35 lbs. of coal per mile, costing \$4.00 per ton, or at a rate of 6.33 cents per mile, the cost of fuel on the motor car is excessive.

Of the steam motors, that of the Taff Vale Railway is one of the most interesting. One end of the car is carried on an ordinary bogie truck. The longitudinal section of the latter shows the method of attaching the body. The car has no body bolster but the end sill rests directly on the truck bolster to which an attachment is made in the ordinary manner with a king pin. The support is thus carried so far out on the end of the car that the latter is not disturbed by the vibrations of the engines. The body is divided into three compartments: a small van whose width is just equal to that of the door in the side by which it is entered, and which is at the end over the motor truck; a third class compartment seating 40 passengers, with a center aisle and cross seats, and a first class compartment with side seats as in the ordinary tram car.

The general construction of the motor truck is clearly shown by the longitudinal section, the most interesting feature of which is the boiler. It is a locomotive boiler whose fire-box is at the center of the tubes extending on either side. These are 312 in number and  $1\frac{1}{4}$  in. in diameter. The boiler stands across the

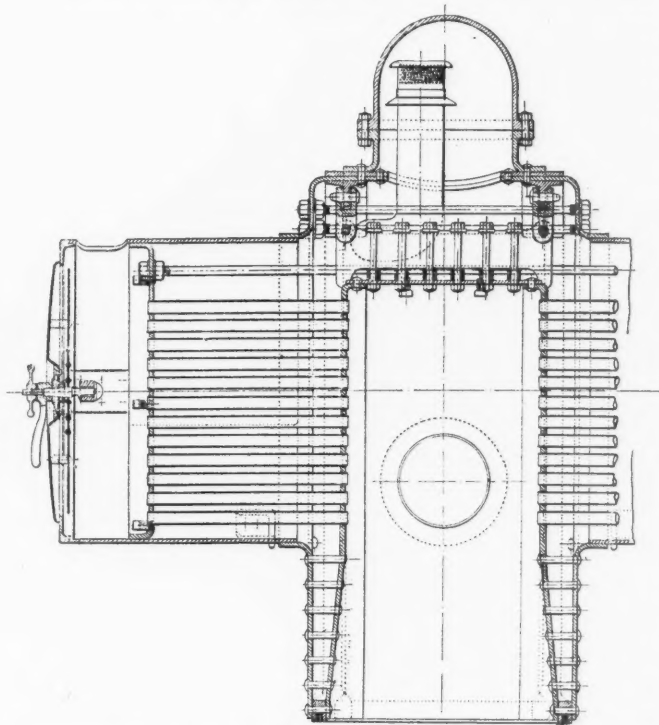


Longitudinal Section of Taff-Vale Motor Car Truck.



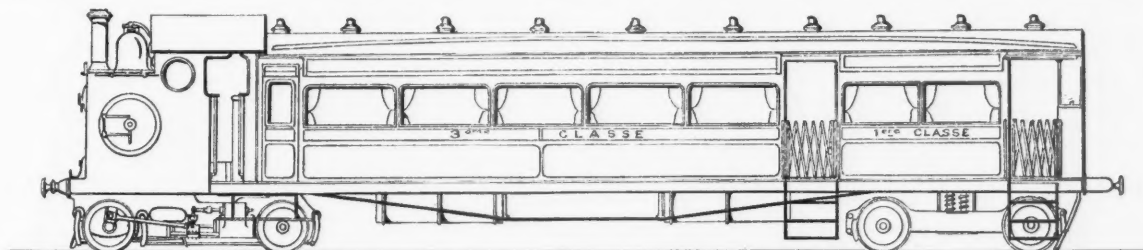
car and the stack is at the center, flues leading to it from the smokeboxes on either side as indicated by the dotted lines in the engravings. The cleaning of the tubes is made very easy by the presence of doors in the two smokeboxes.

Outside cylinders are used, whose connecting rods are coupled



Longitudinal Section of Transverse Boiler for Taff-Vale Motor Car.

to the wheels at the end of the car, no coupling rods being used so that the other pair are trailers. In operation, in order to avoid turning the car at each terminal, the conductor stands on the back platform, when the car is run with the compartment end to the front, where he is in electric communication with the driver.



Side Elevation of Taff-Vale Motor Car.

and also has control of the throttle and whistle as well as the hand brakes on the bogie truck.

The following are some of the principal dimensions:

Cylinder, diameter	9 in.
Cylinder, piston stroke	14 "
Heating surface, firebox	39.27 sq. ft.
" " tubes	301.28 "
" " total	340.55 "
Grate area	8.0 "
Wheel base, motor truck	8 ft. 6 in.
Wheels, diameter	34 in.
Boiler pressure	165 lbs.
Tractive effort	2,200 lbs.
Length of car over all	66 ft. 6 in.
Distance between truck centers	40 " 8 "
Total weight	73,100 lbs.

#### Boston's View of the Differential Question.

The Boston Chamber of Commerce Committee on Differential Freight Rates has submitted its report, in which it maintains that the decisions which the Interstate Commerce Commission gave, in its capacity as an arbitration board, discriminate severely against Boston in favor of Baltimore and Philadelphia. It will be recalled that the adjustment of the export differentials, as between Boston, New York, Philadelphia and Baltimore, was voluntarily given to the Commission last spring, and that the Commission made no change in the status of Boston as compared with New York. It was decided that the rate on export traffic, except iron and grain, should,

as heretofore, be from 7c. first class, to 2c. sixth class, per 100 lbs., higher than the New York rate, while iron and grain should take the same rate to Boston as to New York, when shipped for export. The Philadelphia and Baltimore differentials from New York were not greatly altered. (For a table showing the changes, see the *Railroad Gazette*, May 26, p. 573). It transpired at an early stage of the preliminaries that the interests of Boston and New York in this proceeding were from certain points of view at least not antagonistic, and the representatives of these two cities co-operated harmoniously throughout.

The following is an abstract of the argument now presented by Boston:

Taking the average for the years 1897-1901, inclusive, as against 1903, we find that in the export of:

Grain—Philadelphia decreased 45 per cent.; Boston decreased 46 per cent.

Provisions—Philadelphia increased 25 per cent.; Boston decreased 24 per cent.

Flour—Philadelphia increased 65 per cent.; Boston decreased 32 per cent.

Cotton—Philadelphia increased 390 per cent.; Boston decreased 36 per cent.

Petroleum—Philadelphia increased 17 per cent.; Boston decreased 21 per cent.

Miscellaneous Cargo—Philadelphia increased 30 per cent.; Boston decreased 21 per cent.

During the same term, except in the case of flour, which increased 6 per cent., Baltimore showed a considerable decrease, but except in the cases of grain and provisions the decreases were much smaller than in the case of Boston.

In 1904 there was a very heavy decrease in exports from all Atlantic ports, but contrasting the five-year period 1897-1901 with 1904 we find that in exports of:

Grain—Boston decreased 75 per cent.; Baltimore decreased 68 per cent.; Philadelphia decreased 68 per cent.

Provisions—Boston decreased 24 per cent.; Baltimore decreased 20 per cent.; Philadelphia increased 28 per cent.

Flour—Boston decreased 55 per cent.; Baltimore increased 2½ per cent.; Philadelphia increased 22 per cent.

Cotton—Boston decreased 42 per cent.; Baltimore decreased 22 per cent.; Philadelphia increased 499 per cent.

Petroleum—Boston increased 2½ per cent.; Baltimore decreased 14 per cent. (on very nominal amounts); Philadelphia increased 32 per cent.

Miscellaneous Cargo—Boston decreased ⅓ per cent.; Baltimore decreased ⅓ per cent.; Philadelphia increased 42 per cent.

So that the discriminating effect of the differentials in favor

of Philadelphia and Baltimore as against Boston was proven by figures which were submitted in the statement of the Philadelphia case. The large annual clearance of steamers in ballast to load at southern ports with cargo for Europe was also demonstrated by one of the Boston exhibits.

Boston contended that conditions both on land and water have radically changed since these differentials were first adopted; that the existing differentials represent a greatly increased percentage of the inland freight rate to Baltimore and Philadelphia, and it was demonstrated that ocean freight rates from Baltimore and Philadelphia can be, and often are, as low as from Boston, and at times much lower, with ample profit to the Baltimore and Philadelphia steamship lines; that when ocean rates are higher at the southern ports it is simply because of concentration of freight at those ports brought about by the inland differentials, thus enabling the southern steamship lines to secure, by higher ocean rates, a part, and in some cases all, of the inland differential as a gratuity or subsidy.

Boston insisted that the great bulk of export traffic moves from point of origin to foreign destination via the cheapest route; that this is especially true of flour, grain and other staple commodities, the quality of which is not affected by moderate difference in the time of transit; that through rates on export traffic must therefore be uniform via all Atlantic ports or the route charging a higher rate, however slight, will be effectually shut out of participation.

These propositions were sustained by positive written state-

ments by a number of the largest flour millers and grain exporters in the United States that they would not pay any premium, however small, for the privilege of shipping via a port of their own selection over and above the lowest through rate which they could obtain via any one of the ports of Newport News, Baltimore, Philadelphia, New York or Boston.

Boston contended that if the Commission should now overrule the principle of equal rates on export traffic via all Atlantic ports and decide that the southern ports are entitled to differentials as against New York because of special advantages inherent to that port, then Boston is likewise fairly entitled to a similar differential in order to bring about an equalization of competitive advantages at all Atlantic ports other than New York. On this proposition the Commission made this significant admission: "It is possible that in the future it may become evident that Boston cannot fairly compete for the traffic upon the present basis."

Thus for the first time a flaw appears in the sole right and title to differentials so long monopolized by Baltimore and Philadelphia, and which they have regarded as an almost sacred inheritance. Philadelphia in defending its privileges relied in part upon the assertion that its ocean freight rates are higher, but this was clearly disproved by the Boston exhibit of weekly comparative ocean rates from the various ports.

Philadelphia relied in part upon its claim of shorter distance from the interior, but this factor is entitled to small consideration, as it does not represent a correspondingly lower cost of performing service. Philadelphia, however, so far as can be determined, based its claim to preferential treatment principally upon the time-honored Pennsylvania doctrine of Protection. Its mercantile "infant industries" still need nursing. Their cry is "Save us or we perish!" It is the same old and long successful attempt to secure by legislation those advantages which should result from native energy and local enterprise.

Boston asks no such favors. She is willing to take her chance in fair competition with any of the other ports, New York included, upon the basis of equal inland, or uniform through, rates on export traffic, relying upon the enterprise of her terminal railroad and the energy of her merchants to secure her just proportion of the trade.

Baltimore demanded preferential treatment because of shorter distance from the interior, higher ocean freights, and, like Philadelphia, the need of protection, because of her relative inferiority and inefficiency as a trading port. The claim of higher ocean freight rates was exploded by the Boston exhibits.

Baltimore ignored the fact that the distance principle has not for years been an important factor in the fixing of competitive rates. Longer haul has been used by the railroads as an excuse for lower rates but never as a reason for higher ones. A shorter haul uphill may be more costly than a much longer one on the level or down grade.

The insistent plea of Baltimore was, however, that the New York (and consequently the Boston) railroads be forced to charge higher rates than they were willing to accept because, to quote the Baltimore argument, "In carrying freight to New York they have done a better job" than the roads carrying similar freight to Baltimore or Philadelphia.

It would be hard to conceive a more audacious, unjust and arbitrary violation of public policy than to force the railroads to keep their rates up when they, themselves, desire to give the public the benefit of a reduction.

Philadelphia and Baltimore claimed that rates of marine insurance are higher from those ports than from Boston and New York, and that this is an additional reason for granting them a differential. This claim was completely refuted by the submission on behalf of Boston of letters from agents of several of the leading marine insurance companies, both American and foreign, in which they stated that the rates were precisely alike on vessels of the same classification, whether they sailed from Baltimore, Philadelphia, New York or Boston, and that they had placed insurance now in force on these terms.

The report and opinion of the Commission defies analysis. It openly confesses a vain search for some fundamental principle upon which to settle the dispute. Failing in this it flounders around in an abortive attempt to justify the indefensible. It undertakes to "rob Peter to pay Paul" and to accomplish the impossible feat of pleasing everybody without offending any one. It enunciates as facts statements contradicted by the evidence submitted. It strives to create an artificial division of the export traffic between the different ports by strangling competition through a so-called "equalization of advantages."

Here it asks, "What can be more just than to give each port the inland rate to which its location entitles it and to let it secure such portion of this export traffic as its ocean facilities can win for it?" while there it says, "The port of export is but a single station on the through line," and "Nothing can be more certain than that these inland rates upon through traffic should be treated as a part of the entire through rate."

It asks, "what will equalize the advantages of transportation through these various ports?" Yet expresses the opinion that the

ideal condition would be the establishment of rates that would reward by increased business port enterprise in the line of improved service or facilities, and thus insure that healthy struggle of locality against locality which is the best security for proper commercial development.

Notwithstanding these premises it suggests as a reason for taxing traffic via New York the fact that that port "has quicker and more reliable service, more frequent sailings, ability to reach a greater number of ports, superior banking facilities, better storage facilities, etc." In one place it lays stress upon distance as a most important factor, and in another, where the distance from Buffalo to Baltimore, Philadelphia and New York is equal, or in fact slightly less to New York than to Baltimore, it ignores its former view and conceives it to be of no consequence.

Admitting, so far as lake-and-rail grain is concerned, the contention of Boston and New York that the effect of the differentials may be to force traffic into unnatural and more expensive routes, it attempts to refute the argument as relating to all-rail grain, but altogether ignores the main contention, viz., that the refusal to permit the railroads running to New York and Boston to reduce their rates to the Baltimore basis imposes a tax to the extent of the exact amount of the difference on all differential traffic destined for foreign ports with which the southern ports have no direct connection.

In regard to the lower grade freight such as flour, grain, etc., it expresses the opinions:

First—That "The through rate should be substantially the same by all lines" (i.e., routes).

Second—That it is impossible to decide what inland differential would produce this equality of through rates.

Third—That equal through rates would give New York an unequal share of the export business. And

Fourth—That Philadelphia and Baltimore are entitled to a lower rate; which, it adds, they have had in effect for the last seven years.

Was ever confusion worse confounded?

It declares that "flour moves to the seaboard under substantially the same condition and at practically the same cost as grain," yet the ex-lake differential on flour is fixed at 2c. per 100 lbs. to Baltimore and 1c. to Philadelphia, while on wheat it is but ½c. per 100 lbs. to either port.

In this remarkable decision the Commission, after stating that the purpose of the original differential agreement of 1877 was to create equal through rates, finally decides that, subject to slight modification, the differentials provided for in that agreement should now substantially be retained for the astonishing purpose of creating unequal through rates.

Lastly, the Commission has, to the extent of its ability, compelled the New York and Boston railroad lines to charge higher rates than they are ready and willing to accept.

Boston would prefer to rely upon her own pluck, industry and foresight to secure her just proportion of the export traffic, but if the advantages of a port are to be capitalized; if lack of facilities is to command a premium and their development is to constitute a handicap; if legislation is to compel what civic pride, local energy and liberal investment should command, then Boston wants its fair share in the distribution of favors.

We believe, however, with Commissioner Clements, that these export freight differentials are in themselves illegal, inasmuch as they are an interference with free competition, and are therefore in restraint of trade. We believe that the original cause for their establishment, as stated in the agreement of 1877, and in the report of the Thurman Commission as conceded by the Interstate Commerce Commission in 1898, no longer exists, and we therefore shall not cease to demand their abolition.

#### Locomotive Exports.

The following table compares locomotive exports in the years ending June 30, 1903, 1904 and 1905:

	1905.		1904.		1903.	
	No.	Value.	No.	Value.	No.	Value.
Europe .....	1	82,693	1	82,693	2	\$25,600
British North America .....	133	\$883,563	172	1,767,592	105	1,134,126
Central America .....	40	60,810	4	37,150	1	6,000
Mexico .....	46	368,126	155	1,934,521	102	1,238,776
Cuba .....	35	220,601	21	145,436	11	67,970
West Indies .....	3	8,325	..	..	..	..
Argentina .....	15	207,448	19	137,596	1	8,380
Brazil .....	8	117,086	13	129,791	8	119,559
Colombia .....	2	19,330	5	47,251	..	..
Other South Am. ....	15	98,416	22	249,207	6	56,290
Chinese Empire .....	25	286,825	6	39,750	4	25,400
Japan .....	151	1,276,045	74	624,873	32	275,042
British Australia .....	1	3,300	1	5,500	..	..
Philippine Islands .....	1	2,550	..	..	1	2,395
Other Asia & Oceania ..	3	27,405	8	119,220	..	..
British Africa .....	3	16,180	2	9,110	16	260,330
All other Africa .....	2	21,000	1	11,822	..	..
Totals .....	453	\$3,617,010	504	\$5,261,422	289	\$3,219,778

This gives an average value of \$11,141 in 1903, \$10,439 in 1904, and \$7,984 in 1905. It will be seen that Canada and Mexico, hitherto by far our best customers for locomotive equipment, have both been exceeded this year by Japan.

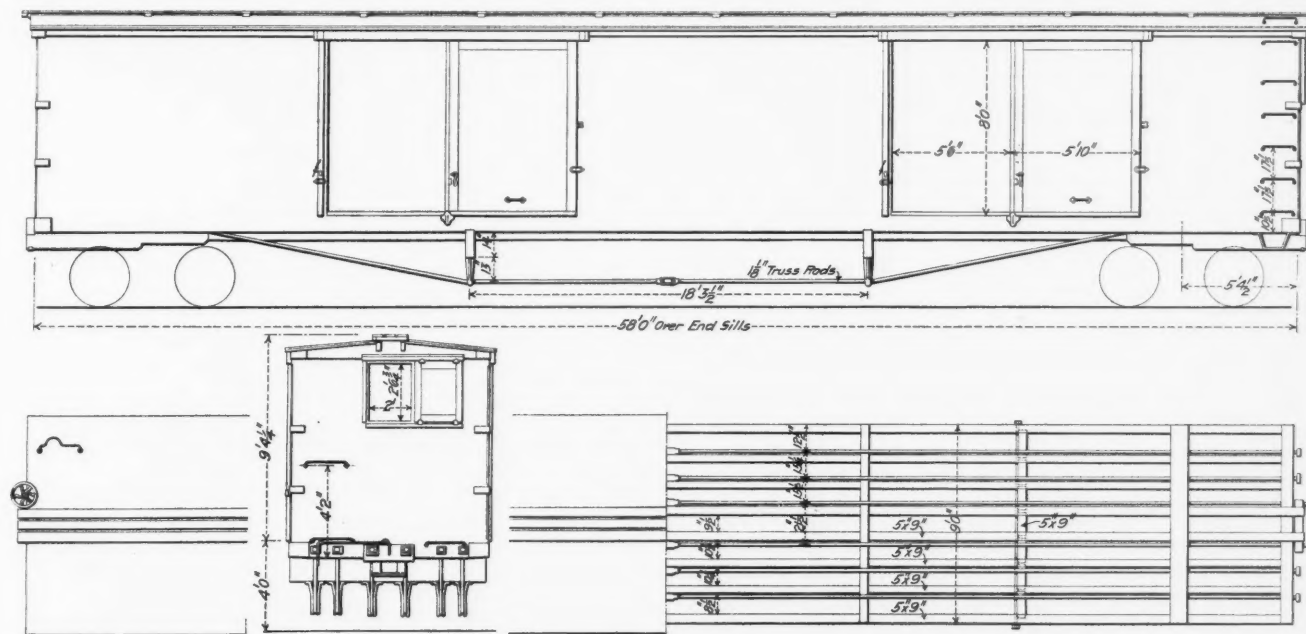
## Transfer Cars of the Great Northern.

Hamline Transfer of the Great Northern Railroad is a large freight transfer station between St. Paul and Minneapolis designed to relieve congested local conditions in the two cities. Freight destined for these two points is received at Hamline, loaded into transfer cars and sent to the city freight depots. Out-bound freight is handled in reverse order.

For this service the road recently designed and had built a lot of special transfer cars, the general plan of which is shown herewith. The most notable characteristic of these cars is their unusual length, which is 58 ft. over end sills. The underframe has four intermediate sills, or nine sills in all, and is trussed with six  $1\frac{1}{2}$ -in. rods. The needle beams are 14 in. deep and the queen posts 13 in. high, giving a truss depth of 27 in. Each side of the

deputy surveyor, and party, who were engaged in surveying the upper peninsula. While running the east line of township 47 north, range 27 west, they observed, on Sept. 19, 1844, by means of the solar compass, the most remarkable variations in the direction of the needle. Mr. Burt was the inventor of the solar compass, and when the fluctuations indicated a variation of 87 deg. he was tremendously excited. He directed the members of his party to look around for the presence of minerals. A mere rip of the sod revealed the ore. The surveying party duly recorded their discovery in their reports, but they appear not to have mentioned it to anyone who could profit by the discovery.

In the spring of 1845, P. M. Everett, of Jackson, Mich., concluded that he would investigate the reports concerning copper in the Lake Superior region, and undertook the journey, accompanied by four men. They found the deposits known later as Jackson



Plan and Elevations of 58-ft. Transfer Box Car for the Great Northern.

car has two doors 10 ft. 3 in. either side of the middle. The cars are mounted on arch-bar trucks with Haskell & Barker iron truck and body bolsters, and are equipped with continuous draft rigging. They are, of course, confined to the service for which they were designed, never being permitted to get into road service.

## Development of the Lake Superior Region.

At the semi-centennial celebration of the completion of the first canal at Sault Ste. Marie held July 26 and 27, the Hon. Peter White, President of the Semi-Centennial Commission, presented an interesting historical address on the "Development of the Lake Superior Region," in which he outlined the steps in the growth of the northern peninsula of Michigan from a wilderness to what is perhaps the greatest mineral producing region in the world. He said in part:

As early as 1636, Lagarde, in a little book published in Paris, made known the existence of copper in this far-off country. The Jesuits, too, from 1632 to 1672, frequently spoke of the existence of copper. Claud Allouez visited the Lake Superior region in 1666 and makes mention of a large mass of native copper which was plainly visible there near the shore of the lake. The first attempt at development was made as a result of the account of the mineral deposits related by Captain Jonathan Carver, who visited Lake Superior in 1765. Alexander Henry, an Englishman, organized a company to exploit the resources of the region, and built a barge at Point Aux Pins and laid the keel of a sloop of 40 tons. They also erected an air furnace at Point Aux Pins. They found specimens of silver, lead and copper, but not in quantities.

Nothing further was done towards the development of this region for nearly three-quarters of a century. It is to Dr. Douglas Houghton that the credit belongs of discovering the presence of copper in the upper peninsula though he discovered no mines in the commercial sense. The first copper mine, the famous Cliff at Eagle River, was discovered by John Hays, of Pittsburg, later of Cleveland, on Nov. 18, 1844, and in a period of 10 years from 1846 to 1856 it yielded \$3,858,000 upon an original investment of \$108,000.

Iron was first discovered by William A. Burt, United States

mountain and the Cleveland mountain. The following spring another expedition was fitted out by Mr. Everett to visit the Jackson location. They returned to the mouth of the Carp river with 300 lbs. of ore upon their backs. Some of the ore was then taken to Mr. Olds, of Cucush Prairie, who succeeded in making a fine bar of iron of it in a blacksmith's furnace, the first iron ever made from Lake Superior ore. In the spring of 1847 the Jackson company constructed a forge on the Carp river, about three miles from the mine, and on Feb. 10, 1848, the first iron ever made in the Lake Superior region was made in this furnace by Ariel N. Barney. The daily product was about six tons, requiring two teams of six horses each to convey the blooms to Marquette, which lay 10 miles away.

The Marquette Iron Co. established its forge in 1849, the second to be established in the region. It was during the winter of 1850 that ore was first hauled from the Cleveland mine. During the winter of 1850 about 25 double teams were employed in hauling the ore to the forge at the lake, where it was crushed and then made into bloom iron ready for shipment. This venture of making blooms was most disastrous. The cost of getting the ore to the lake, the cost of the charcoal, the unloading at Sault Ste. Marie, the portage over the falls, the loading again upon small vessels, made the actual cost of the blooms so excessive that it was impossible to win a profit from their manufacture. By the time the blooms were laid down at Pittsburg they had cost altogether about \$200 per ton, while the market price for iron at that time was about \$70 a ton.

The Cleveland and Jackson companies began the construction of a plank road to the mines, but in 1853, after the successful test of a few tons of ore in a blast furnace at Sharon, Pa., they determined to convert the plank road into a strap railroad, and rails for that purpose were sent up from Sharon. Meanwhile Congress had authorized Michigan to give 750,000 acres of land to any company that would undertake to construct a canal around the rapids of Sault Ste. Marie. Work was begun upon the canal in 1853 and was finished in 1855, water being let into it on April 19, the sidewheel steamer "Illinois" passing upward on June 18 following, and the sidewheel steamer "Baltimore" passing downward immediately thereafter on the same day. The first shipment of ore through the



canal was on the brig "Columbia," on Aug. 17, 1855, and was forwarded by the Cleveland Iron Mining Co. and also consigned to the Cleveland Iron Mining Co. at Cleveland. In all 1,449 tons were shipped through the canal that year, constituting the total shipments of the peninsula. All this ore was shipped by the Cleveland Iron Mining Co., as the Jackson and Lake Superior companies were not prepared to ship any at all.

The strap railroad to the mines was finished three or four months after the canal was in operation. The motive power was mules, and the cars held about four tons each. The cars were flat bottom and a team could not make more than one trip a day—sometimes not that—and for the entire motive power to move 35 tons a day from the mines to the lake was regarded as a big day's work. The grades were steep and the cars frequently ran away.

Herman B. Ely had begun the construction of a steam railroad to the mines, and when Congress passed the land grant in 1856 to stimulate the construction of railroads, overtures were made for consolidation with Ely's steam railroad. Ely's steam railroad to the mines was finished in September, 1857. The first locomotive used upon it was the "Sebastopol," which was carried up the lakes on the brig "Columbia." The second locomotive was named "C. Donkersley," which was brought up on the schooner "E. C. Roberts." Both these locomotives were built by the New Jersey Machine & Locomotive Works, Paterson, N. J.

With this motive power it was possible to move 1,200 tons per day. The little dock at Marquette was a flat structure without trestle work, and the ore was put aboard steamers by means of the gangplank and wheel-barrow. All ore was practically carried in sailing vessels as the steamers of those days were passenger boats and had practically no means of carrying ore without making a deadful litter upon the deck. It was not for some years thereafter that anyone thought of building steamers exclusively for the ore trade. The common opinion was that iron, being a low priced material, would always be carried principally in sailing vessels, which it was supposed would always remain the cheapest mode of transit.

It was in 1865 that the Peninsula Railroad, projected mainly through the efforts of Mr. Charles T. Harvey, who built the first canal at the Sault, was extended from Escanaba on Green Bay to the iron mines at Ishpeming and Negaunee, a distance of 62 miles, thus forming another outlet for the ore of the Marquette range. The growth of the ore trade, however, was slow, and for many years lumber continued to be the important trade of the lakes. It was in 1869 that the first steamer designed for ore carrying purposes exclusively was built. This was the steamer "R. J. Hackett," which was built to carry the ore of the Jackson mine. The following year the "Forest City" was built as her consort. Prior to that time ore had been carried principally in sailing vessels and towing had become a profitable business in the rivers. First of all sailing vessels were lashed alongside of the little propellers and towed through the rivers, as is the common practice in the coast ports to-day. Later, however, astern towing was found more convenient and it was common to see seven or eight sailing vessels towing behind one steamer. The propeller and its consort, however, proved handier, and in the 70's displaced altogether the system of towing through the rivers. Gradually the sailing vessels which had been living an independent existence became consorts to steamers themselves.

In 1877 the Menominee range was opened and by 1879 had become an important contributor to the stream of ore going down the lakes. The problem of loading the ore had been solved by means of pockets and chutes in the ore docks, but the problem of unloading it was a severe matter. The first ore was unloaded in tubs by means of a horse, block and tackle. The horse by walking forward hoisted the tubs out of the hold, where it was dumped into barrels and wheeled ashore. In order to get the tub into the hold again it was necessary for the horse to back up. It took two days to unload a cargo of 400 tons by this means. In 1867 Robert Wallace installed on the docks at Cleveland a little portable engine to take the place of the horse, and in this manner secured increased despatch.

In 1884 the Gogebic range made its first shipment and shortly thereafter in the same year the Duluth & Iron Range Railway was completed to the Minnesota mine on the Vermilion range, bringing this great ore body into the market. Six years later the Mesabi, the world's unrivaled ore deposit, was discovered, and in 1892 began shipments. Though only 12 years old, Mesabi's shipments now exceed those of any range, having passed the total shipments of the Marquette range last year. Sudden as has the expansion of the ore trade been—more than one-third of the total movement being the work of the past five years and more than three-fourths of the total movement the work of the past 10 years—vessel tonnage and dock equipment have both expanded to care for it with ease. This is a remarkable achievement in a trade subject to such violent disturbances as is the iron trade, where the movement of ore may fluctuate between wide latitudes, increasing from 1,000,000 tons one month to 5,000,000 the next. A system that will accommodate itself with ease to such a trade as this is remarkable, but such a system exists on the lakes. The vessels of the great lakes have grown until they now rival in dimensions the ocean liners. Arched

girders have taken the place of stringers and stanchions, so that the hold is entirely uninterrupted and no part of the vessel's structure interferes with the operation of the unloading machine.

The fact which militated against high unloading speed was that the tubs had still to be filled by hand. This problem has now been solved by the invention of an automatic bucket which fills itself in any grade of ore. These buckets lift 10 tons of ore at one time and by their use vessels carrying over 10,000 tons of ore have been unloaded in a little over four hours' time.

Freight rates on the lakes were a sort of a jumping jack in the early days, but they are now becoming as stable as rail rates. In the fall of 1866, \$6.50 was paid to freight ore down the lakes, and in November, 1871, it went to \$7. Now the contract rate is 75 cents from the head of the lakes, with a wild rate that scarcely varies from that figure.

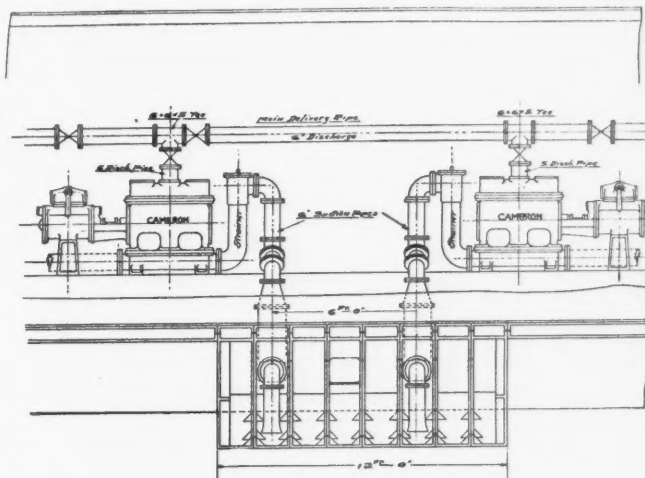
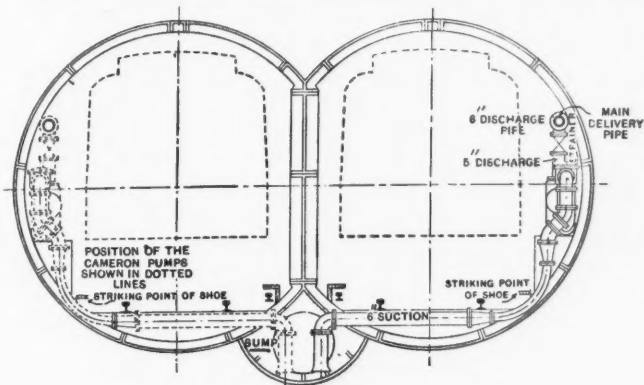
In the early days they started to make pig iron in the peninsula. Everyone thought that that was the proper thing to do until they discovered that it wasn't. We could make about six tons a day in our little forges and lose a great many dollars on every ton. The first pig iron produced in the Lake Superior region was made in 1858 by Stephen R. Gay, who leased the forge of the Collins Iron Co., which was the third forge to be established in the peninsula, and converted it into an experimental miniature blast furnace. The first blast furnace in the Lake Superior country was built in 1858 by the Lake Superior Iron Co. of Negaunee. It was called the Pioneer furnace. About 25 furnaces were started in the next 10 years, 13 of which were in operation at the end of the decade, but only one of them now survives, the "Pioneer," which was transferred a few years ago to Gladstone. The time was not ripe then for iron making in the peninsula. There was no consuming population within its natural market. This condition is now being gradually changed, however, as the northwest is becoming populated. Lake Superior ores, however, are fully three-quarters of all the ores mined in the United States, and this year fully 80 per cent. of the pig iron metal that is made in this country will be made out of Lake Superior ore. The iron trade of the United States practically had its birth with the discovery of the Marquette range. It has been reinforced steadily by the discovery of other ranges until it now rests upon the firm basis of Mesabi, the most abundant and the easiest mined high grade ore in the world. In 1855, the year in which it became commercially possible to ship Lake Superior ore, the United States produced 700,159 tons of pig iron, as against 3,218,154 tons by Great Britain. By 1869, by which time Lake Superior ore was moving freely, the United States produced 1,711,287 gross tons of ore as against 5,445,757 tons in Great Britain, and 1,409,429 in Germany. The encroachment upon the British lead by reason of the profusion, quality and ease of transit of Lake Superior ore by the United States has been steady until in 1890 we find the United States passing Great Britain by making 9,202,703 tons of pig iron against 7,904,214 tons in Great Britain, and 4,641,217 tons in Germany. In 1903 the pig iron production in America reached its high water mark, making 18,009,252 tons against 8,935,063 tons in Great Britain, or more than once again as much as Britain. Germany during 1903 made 10,085,634 tons of pig iron. The present year of 1905 is, however, expected to be the record-breaking year of all, when more than 30,000,000 tons of Lake Superior ore will come down the lakes, and when the furnaces of the United States will, according to the monthly rate of the present year, safely make more pig iron than Great Britain, Germany and France combined. One single company alone, the United States Steel Corporation, produced last year more steel than was made in the whole of Great Britain. The steel output of the Steel Corporation last year was 8,406,378 tons, against 5,134,102 tons, exclusive of castings produced in Great Britain.

#### Draining the Interborough Rapid Transit Tunnel under the Harlem River.

One of the most difficult engineering problems connected with the building of the Interborough Rapid Transit Company's subway in New York City was the construction of the twin tunnels under the Harlem river on the Bronx division. These tunnels were built by an original and novel method, which was quite fully described in the *Railroad Gazette*, Sept. 4, 1903. They are twin tubes 641 ft. long and 16 ft. in diameter inside, the top of the tunnel being 20 ft. below low water. They are built of segmental cast-iron rings lined with concrete and the work was carried out in an open cofferdam; half the length of each tunnel being built at a time, while the remainder of the channel of the river was left open for navigation. On account of the fact that the tubes are in water-bearing ground, it was necessary to provide a complete drainage and pumping system to take care of the water which percolates through the walls and also to provide for emergencies in case of the breaking of a water-main in the tunnel or other similar accident. The accompanying drawing shows a cross-section through the two tunnels, the location of the discharge pumps and the suction wells. On account of the very narrow clearances, a special design of pump

was installed. These pumps were designed and built by the A. S. Cameron Steam Pump Works, New York; have 12-in. x 12-in. x 18-in. cylinders, and are of the simplex, single-cylinder pattern, having the regular Cameron pattern steam end; although the pumps will be worked with compressed air. Four pumps were installed; two in each tunnel, at the junction of the subway proper and the tunnel under the river. The illustration from a photograph shows the pumps in position on concrete foundations built in the wall of the

cylinders are very compact, their extreme width being only 19 in. Nevertheless, they have ample water valve area. The water valves are set in movable valve decks, allowing them to be quickly and easily removed. The suction valves are under the water cylinder and the discharge valves are placed above the water cylinder. Each of the pumps is capable of delivering 600 gallons of water per minute when running at normal speed under a lift of 70 ft. and with an air pressure at the throttle of about 70 lbs. per sq. in. In cases



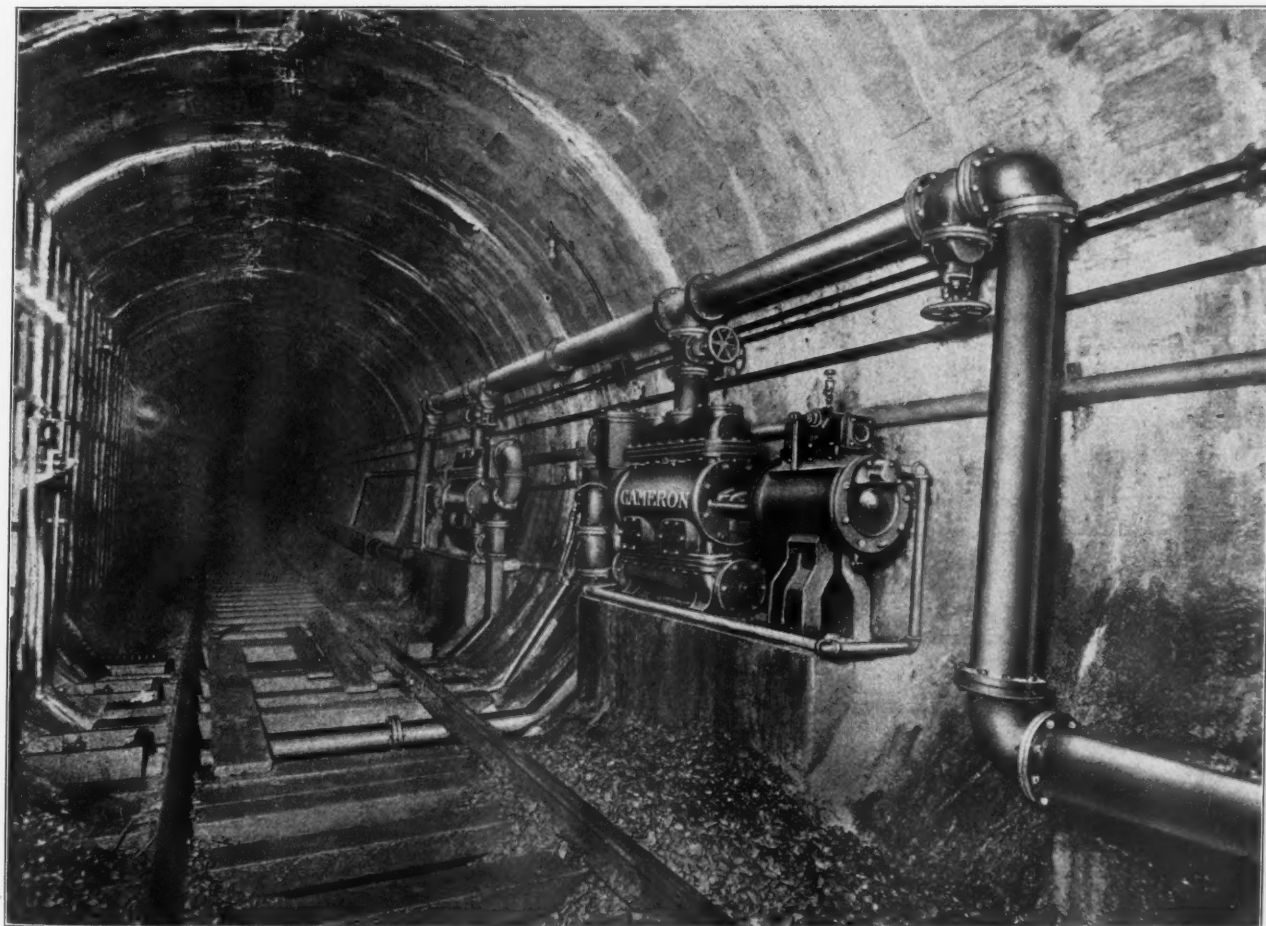
Cross-Section of Harlem River Tunnel and Section Through Pump Well.

tunnel, and also the piping and connections for the suction and discharge mains. The 6-in. suction pipes leading to each pump draw their supply from a single sump at the lower end of a large central drain running under both tunnels.

Each pump has a separate air line to the compressor plant, which is located about three-quarters of a mile away, above ground. The pumps are controlled automatically by separate floats located in the tunnel. It will be seen from the illustration that the water

of emergency this capacity can be increased to 1,000 gallons per minute.

The valve chambers are constructed so as to permit of easy access for inspection and repairs. The water piston and rods are of composition metal, and as the water is very dirty and gritty the water cylinders are made with removable composition metal bushings. Cameron strainers of the goose-neck pattern are supplied on the suction pipes to keep out dirt and rubbish and to insure the



Cameron Pumps in Harlem River Tunnel of the Interborough Rapid Transit Subway.



priming of the pumps by keeping the suction chambers filled with water. There are no outside rods or valve gear to become broken or to get out of alinement and the working parts are substantial and few in number. In case the tunnels were flooded completely, floating timbers and debris could do little or no harm to the pumps.

These pumps have already been severely tested when some time ago water was discovered entering the tunnel. Temporary piping and connections were hurriedly made and the pumps were pressed into service on short notice. They were kept in operation day and night and the inflow of water was easily taken care of, so that there was but slight interruption to the completion of the work.

#### The Lackawanna Terminal Fire.

The buildings of the Hoboken terminal of the Delaware, Lackawanna & Western Railroad were destroyed by fire on Monday night, August 7. Reports indicate that the fire started on board the ferry-boat "Hopatcong," which was tied up in her slip for the night. The flames spread to the ferry-house and to the adjoining station and train-sheds, which were all old buildings and of light construction. The lower portion of the ferry-house, excepting one slip, was totally destroyed as well as the station and train-shed. The new emigrant station south of the depot, which cost \$75,000 and which was only opened last week, escaped serious damage. The ferry-boat "Hopatcong" was totally destroyed and the upper works of the ferry-boats "Montclair" and "Binghamton" were badly burned. A number of passenger cars were in the train-shed. Many of these caught fire, but were got out by the yardmen before they were badly damaged. Adjoining the train-shed of the D., L. & W. was the terminal of the North Hudson Railroad Company and the train-shed of the Public Service Corporation, in which about 50 trolley cars were stored. These, as well as the old Duke House, which was across the street, were destroyed. The total loss is estimated at about \$250,000. The officials of the D., L. & W. state that the railroad's loss alone will be upwards of \$200,000. So far as is known no lives were lost. Fortunately, the D., L. & W. had already prepared plans for a new terminal which was to be built in the course of the next two years. The emigrant station was part of this new structure. Although the entire passenger terminal was destroyed, the railroad officials made heroic efforts to continue the

regular train service and a temporary station was installed at the United States Express Company's building, which is situated about 100 ft. west of the passenger station. Here Vice-President E. E. Loomis and General Superintendent T. E. Clarke established their headquarters, from which they endeavored to get the system into running order again. A large force of men was immediately put to work to repair the ferry slips, two of which were ready for use in time for the afternoon rush hours. The D., L. & W. has a large local traffic and the question of caring for it was a serious one. Great credit is due to the management for the manner in which they handled the situation. By 4 o'clock of the day following the fire the train schedule of the road was practically restored. The main line trains were run to and from the company's Hoboken terminal with little interruption at any time; suburban trains from points west of Newark stopped at Newark the morning after the fire and passengers to New York came from there by trolley and over the Pennsylvania Railroad, the Erie and the Central Railroad of New Jersey, Lackawanna tickets being honored on all the steam lines. There was no delay in the moving of freight. Ferry-boats were run on 15 instead of 7½ minute headway. All the boats starting from Twenty-third street, Manhattan, went to the Fourteenth street slip, Hoboken. Every other boat leaving the Barclay and Christopher street ferries went to the regular ferry-house at Newark street, while every other one landed passengers at Fourteenth street, and all teams bound for Hoboken had to go to Fourteenth street. The fire will undoubtedly hasten the construction of the new terminal, as the principal difficulty of erecting this station lay in getting rid of the old structures without interfering with traffic. Now that this difficulty has been removed by the fire, work will at once be started on the new terminal.

#### A Train Load of Sugar Pine.

The train shown in the accompanying photograph was made up of 26 cars, each of which carried one sugar pine log, 16 ft. long. The smallest log in this lot was 53 in. in diameter, and the largest, 79 in. The road is the property of the West Side Lumber Co., California. The total scale of the logs on this train amounted to 86,010 ft.



Train Containing 26 Logs—86,010 ft. of Lumber.







# GENERAL NEWS SECTION

## NOTES.

At Broken Arrow, Ind., T., the Missouri, Kansas & Texas is burning 4,000,000 cu. ft. of clay for ballast.

The new ferry terminus of the Delaware, Lackawanna & Western at West Twenty-third street, New York City, is to be opened for business on August 20.

The passenger traffic of the Richelieu & Ontario Steamboat Company on the St. Lawrence River is this summer more than 40 per cent. heavier than last year.

A press despatch from Portland, Ore., says that, the State Circuit Court having finally sustained the anti-scalping law, passed by the legislature of Oregon this year, the 19 ticket brokers of that city have agreed to shut up shop and leave.

The Attorney-General of Nebraska has filed a suit asking to have the Nebraska Grain Dealers' Association dissolved, on the ground that the elevator companies, and others composing it, have combined to force the railroads to grant rebates to members. The association is said to control the handling of 9-10 of the grain sold in that state.

Press despatches indicate that the striking telegraph operators of the Northern Pacific and the Great Northern have been vanquished by the companies. The reports published day by day during the past week have contained a good deal about delays to trains and the probable dire results of the strike, but these statements have all born the marks, more or less distinct, of the fiction mongers. It would appear that the delays to passenger trains were at no time very serious, and that delays to freights lasted only a short time.

On August 5 a passenger on an excursion train of the Chicago & Alton was shot and killed while the train was crossing the Mississippi river at Louisiana, Mo.; a second passenger was wounded, and a third was robbed; all by a man afterward arrested. The reporters seem to be in doubt whether he was a lunatic, an ordinary train robber, or a drunken man. The first victim was shot almost on sight, after having told the robber that he was not armed. A passenger who tried to overpower the robber was knocked senseless, but other passengers soon rallied from their fright, and the robber was turned over to the authorities.

The autumn meeting of the Iron and Steel Institute will be held at Sheffield, Eng., on Tuesday, Wednesday, Thursday and Friday, the 26th, 27th, 28th and 29th of September, 1905. Papers have been offered on the Metallurgical Department of Sheffield University, the Thermal Transformation of Carbon Steels, the Nature of Troostite, the Occurrence of Copper, Cobalt and Nickel in American Pig Irons, Pipe in Steel Ingots, Steel for Motor-Car Construction, the Presence of Greenish-colored Markings in the Fractured Surface of Test Pieces, Over-heated Steel, Segregation in Steel Ingots, A Manipulator for Steel Bars, Machinery for Breaking Pig Iron, and The Influence of Carbon on Nickel and Iron. B. H. Brough, 28 Victoria street, London, S. W., is Secretary.

The Lehigh Valley has adopted regulations for the transportation of explosives which are the same as those recently adopted on the Pennsylvania, and described in the *Railroad Gazette* of July 14, page 43. The transportation of explosives is the subject of an article by Senator Elkins of West Virginia, recently published in *Leslie's Weekly*. It will be remembered that Senator Elkins a year or two ago introduced a bill in Congress to regulate this matter. He has now and then found that his private car, while he was sleeping in it, was left standing on a side-track in a busy yard adjacent to cars loaded with dynamite—a circumstance which lends anything but a pleasant character to one's feelings in the morning. Mr. Elkins says that in Germany trains carrying explosives are run under special precautions, with red signal flags and other things to give suitable warning to everybody. When the announcement is made that a train bearing explosives is approaching, there is "a general withdrawal from the railroad." Mr. Elkins says that the bill which he introduced in Congress met with much opposition, largely from manufacturers of cartridges.

### Passenger Rate War Settled.

A press despatch from Chicago says that the war on passenger differential rates from Chicago to eastern points has been settled and that normal rates will be restored on August 20. The Michigan Central agrees to forego its right to any differential to Buffalo and not to apply any differential rate out of Chicago on through tickets to New York reading over New York Central lines east of Buffalo. It will continue selling tickets at differential rates out of Chicago reading over lines other than those of the New York Central east of

Buffalo, and also continue using differential rates as basing rates by New York Central and other routes east of Buffalo on tickets sold from points west of Chicago.

### English Railroad Accidents in 1904.

The Board of Trade has issued its general report on railroad accidents for 1904. The total length of railroad in the United Kingdom at the end of the year was 22,600 miles; length of main track, 37,255. In this report the figures are compared, not with the accidents of the previous year, but with the average of a series of previous years; this with a view to securing a fairer exhibit of the tendency to increase or diminish. The report says:

On the whole record of 1904 compares favorably with those of previous years. The total number of accidents is still large, but no conclusions can be drawn from gross totals, and it is only when the figures come to be considered in detail that their significance becomes apparent. Putting aside such causes as suicide and foolhardiness, the bulk of the accidents which occur upon railways are traceable either to pure misadventure, to want of ordinary caution on the part of the sufferers, or to errors of judgment and breach of rules on the part of railway servants. It is not always possible to assign a definite cause to an accident, because the origin of some is obscure, and others are contributed to by more than one cause, but such cases are not sufficiently numerous to disturb the general conclusions to which the figures point. It is further to be observed that the numerous accidents which occur on railway premises otherwise than by the movement of vehicles are not, as a rule, specially incidental to railway working, but are common to all forms of industrial occupation. It is only when these deductions have been made that we reach the class of accidents in which improvement is likely to occur. No enactments, rules, or administrative action can affect accidents which owe their origin to human imperfection or to misadventure, and large as the totals are, no considerable diminution in the number of accidents of this character can be reasonably looked for. The utmost that can be done is to exercise ceaseless vigilance over the limited class of preventable accidents, tracing them to their causes, and prescribing such remedies as they appear to call for. Much has already been done in this direction, and the improvement which appears in the gross figures of which preventable accidents form but a small proportion, would be much more apparent if it could be shown in relation to the limited class in which it has mainly taken place.

The danger of railway traveling has been reduced to such a point that in 1904 the chances against a passenger being killed in a train accident in the course of a given journey were more than 200,000,000 to 1. The risks incurred by railway servants—especially those concerned with the movement of traffic—are, of course, much greater. In their case there is an element of danger which cannot be eliminated, though its effect may be minimized by the adoption of suitable appliances and safeguards. The increasing use of such appliances is having an appreciable effect, but the confidence engendered by familiarity with dangerous conditions appears to be responsible for so many more accidents than the want of appliances, that it is, perhaps, unreasonable to hope for any marked reduction in the total number.

The principal totals in the report are given in Table 1, which is condensed as follows:

	1904.		1903.	
	Killed.	Injured.	Killed.	Injured.
Passengers, in train accidents.....	6	534	25	769
Other causes .....	109	2,135	123	1,912
Employees, in train accidents .....	7	114	9	146
Other causes .....	409	3,807	446	3,659
Other persons, in train accidents.....	1	13	0	4
At highway crossings .....	67	28	73	39
Trespassers .....	425	132	442	144
All others .....	49	126	41	112
Total .....	1,073	6,889	1,159	6,785

The number of collisions and derailments during the year was exactly equal to the average of the previous 24 years, during which time there has been, of course, a large increase in train mileage. It is estimated that, taking this into account, train accidents have decreased 18 per cent., which is attributed mainly to improvements in roadway and signaling and to the use of continuous brakes. The list of causes of the 29 train accidents which were investigated shows one due to fracture or loosening of couplings; one to defective construction of road, and all the rest (46) to negligence, long hours, ignorance, excessive speed, etc. This list of causes, however, foots up more than the number of accidents (29), because in some cases more than one cause contributed. Accidents to employees not due to train accidents are now investigated, and out of 4,216 of this class 675 were investigated. Of the total of 4,216, 102 were due to defects of roadway or works; 22 to want of appliances or safeguards, insufficient staff, or unsatisfactory system of working, and 21 were due to neglect or non-observance of



rules under the Prevention of Accidents act. It will be observed that these three items, aggregating 145, cover only about one-thirtieth of the total number of accidents; the other 29 out of each 30 being due to "misadventure," want of caution or misconduct; or, want of caution, etc. on the part of a fellow employee. Eight grades of employees contributed 280 killed and 3,008 injured to this class. The proportions of casualties to number employed are compared with the averages of the previous eight years, as follows:

	1904	1896-1903
Freight trainmen	1 in every 20	1 in every 17
Trackmen	1 " " 252	1 " " 233
Engine drivers	1 " " 73	1 " " 59
Firemen	1 " " 47	1 " " 41
Shunters	1 " " 19	1 " " 14
Porters	1 " " 98	1 " " 82
Passenger guards	1 " " 62	1 " " 59
Laborers	1 " " 320	1 " " 275

In 306 investigations the inspectors made recommendations, which in 219 cases were adopted; in 60 cases they were not adopted, and 27 cases are not yet settled. A long list is given of the causes of these accidents. For example, among those due to defects of apparatus four were due to capstans not in working order; one from the failure of a coupling link; one from want of proper appliances on a tender for watering coal; one from want of a mechanical tablet-exchanging apparatus; one from smoke in a tunnel obscuring the view, owing to want of ventilation; one from want of proper sprags and the use of a bar of pig iron for the purpose; one from the exposure of a point-rod crank; one from unprotected (temporary) signal wires, and so on.

A table occupying six pages gives particulars of a number of accidents at highway grade crossings.

The report contains the usual condensation of the inspecting officers' reports on train accidents which have been published quarterly.

#### Collecting Demurrage in Ohio.

The railroads of Ohio and the Ohio Shippers' Association have made an agreement to have a committee—three members named by the railroads and three named by the Shippers' Association—to adjust appeals against demurrage bills; and the agreement says:

(1.) Car service charges will not be enforced where fault primarily is with the railroad company, for example: (a) Failure to furnish within reasonable time empty cars upon order from shipper when suitable cars are available. (b) Failure to place for unloading within reasonable time cars in yard, for which order for disposition has been received. (c) Failure to move within reasonable time from industry track a car upon which car service has accrued while being loaded. (d) Car service managers will not enforce car service rules where charges accrue due to bunching of cars or the placing of embargoes by railroads. Where consignee is located on other than the carrier line, and cars that may have been bunched or embargoed by one or several of the carrier lines, accumulate in excess of the normal facilities of such consignee, then deliveries shall be so regulated between agents of lines interested, that the fault of the railway shall not react against consignee.

(2.) Car service managers will arrange for the prompt examination of all disputed claims for car service charges so that, as far as practicable, only legitimate charges will be collected.

(3.) Car service managers will arrange with the agents of the railroads to provide prompt payment of all refunds to which shipper may be entitled.

(4.) Car service associations will arrange to change car service rules so as to grant uniformly throughout the state ninety-six hours free time for unloading bituminous coal, coke, fruit and vegetables, and seventy-two hours free time for the unloading of lumber, when such lumber is received in closed cars. When received in open cars, forty-eight hours free time will be allowed as heretofore.

(5.) Car service managers will require agents to notify consignees, who have telephones, of the placing of cars consigned to, or ordered by them, on team tracks, after such cars have been placed.

(6.) Car service managers in the state will arrange to meet quarterly, or oftener if desired, with a committee from the Ohio Shippers' Association for the purpose of hearing appeals from the decisions of car service managers, and other complaints, and adjusting the application of car service rules under these instructions.

(7.) It is recommended to all railroads in the state that instructions be issued by their traffic department to all agents that bills of lading shall be furnished to all consignors on demand.

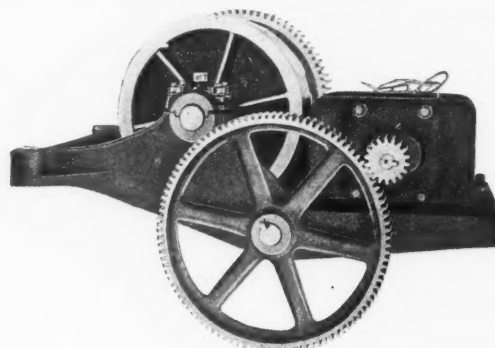
#### Interchangeable Tickets on Electric Lines.

Several of the interurban railroads near Chicago have adopted a new interchangeable passage ticket good over all their lines. Five electric railroads already use these tickets and 15 others in Illinois have already made application for their use. The roads now using them are the Aurora, Elgin & Chicago; Elgin, Aurora & Southern Traction; Joliet, Plainfield & Aurora; Chicago & Joliet and Rockford Interurban. As soon as the roads which have applied for membership are included, a central clearing house is to be

established which will do away with the present individual monthly settlements. Though popularly called a mileage book, the new interchangeable ticket is really not a mileage book at all. Each coupon instead of standing for a certain number of miles, is good for five cents' worth of transportation. This arrangement is made necessary by the fact that the roads using the books have different rates of fare per mile. The whole book calls for \$5 worth of travel and is sold at a discount of 16½ per cent.

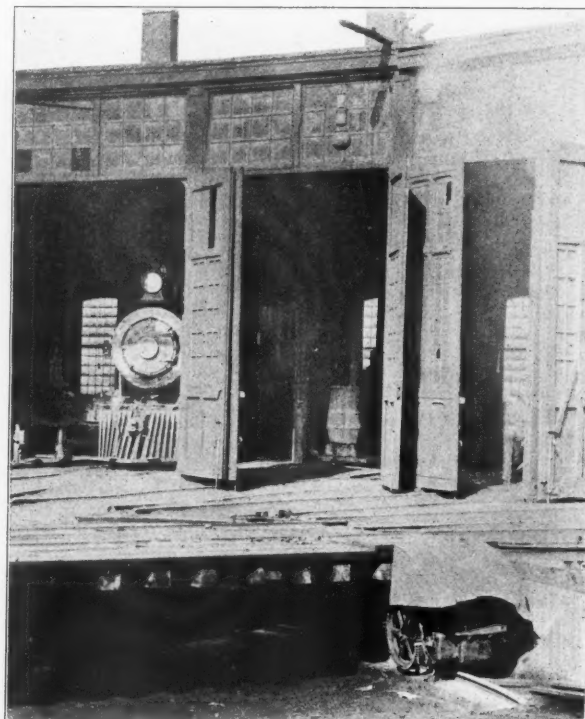
#### Electric "Mule" for Turntables.

The device of the Case Manufacturing Company, Columbus, Ohio, for the electric operation of locomotive turntables is shown



Electric Mule for Working Turntables.

herewith. The designers call it an "electric mule." It is quite simple, consisting of a heavy cast-iron frame with gearing connecting a series-wound motor to the traction wheel. The usual size of motor is 10 h.p., although a 15 h.p. machine is supplied



Electric Mule in Position, Mattoon, Ill.

when desired. The company's F type of controller is furnished with the mule. The installation made for the Big Four at Mattoon, Ill., is illustrated, showing the overhead arrangement for taking care of the wires.

#### A Bouquet from Louisiana.

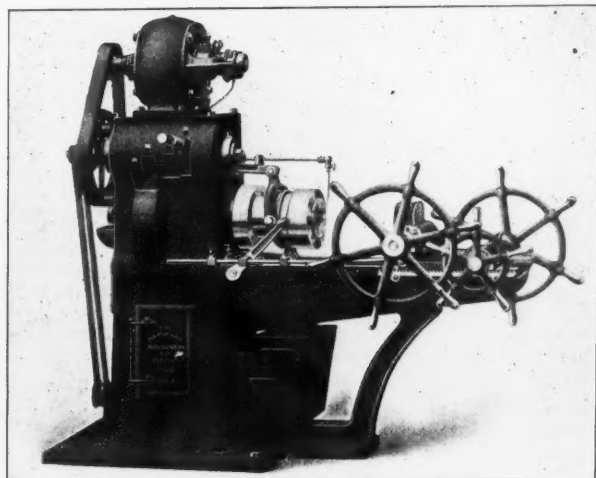
Colonel J. Kemp Ridgely, Division Passenger Agent of the Louisville & Nashville, has again demonstrated himself a very resourceful railroad official. He will not only keep out all mosquitoes possessed of the fever transmitting qualities, but he will saturate the atmosphere inside the Pullman sleepers on the Ellen En with an odor that will outlive that used centuries ago by the ancient rulers of the world. A powder which emits the most delightful odor and which in addition will be a thoroughly medical disinfectant has been prepared for Mr. Ridgely specially for use on the

Louisville & Nashville trains by Dr. A. L. Metz, the noted chemist of this city, and it will be used on all trains leaving New Orleans in the future.

The powder is made by a formula which owes its invention to the science of Dr. Metz. It is unknown to the great majority of people and up to this time has been little used except in the household of the city chemist and in the premises of a few of his friends. The delightful scent imparted by this powder will be wafted through the sleepers by breezes which are to be constantly kept moving by great rotary fans which are now being installed in all the L. & N. sleepers here. The fans are to be set in motion hours before the time of departure in order to free the sleepers of all vestige of the mosquito. After the cars have been thoroughly rid of the disease-carrying insect screens will be adjusted on the doors and windows and the inside of the cars will be proof against the stegomyia.—*New Orleans States*.

#### Bolt Threading Machine with Motor Drive.

The accompanying illustration shows the latest type of bolt threading machine used by the National Machinery Company, Tiffin, Ohio, which is arranged for a motor drive with a suitable speed changing device so that the proper cutting speeds can be obtained even though the motor used is of the constant speed type. As these machines are often placed in forge shops or other isolated places power from shafting is not easily available, the motor-driven type is in demand. The machine shown will take bolts up to 1½ in. in diameter. The gearing in the speed box provides four changes of speed, enabling the machine to handle work of all



A Motor-Driven Bolt-Threading Machine.

sizes within its capacity at the proper cutting speed. It is not necessary to use a variable speed motor, but if the utmost refinement is desired, by using a motor having a speed variation of from 1 to 1.4 a great range of cutting speeds can be secured, as the total speed variation will be as 1 to 5½.

In designing these machines the aim has been to combine effectiveness with simplicity. A minimum number of gears are employed in the speed box, and all of the movements of the gears and the various speed changes are secured by the shifting of one hand lever only. The gears are of large size, and wide face, and there are no gears or pinions sliding on feathers, nor are prong clutches employed. The illustration shows the motor connected to the speed box by a silent running chain, but a raw hide idler and a gear drive direct from the motor can also be used. By placing the motor over the head spindle of the machine the floor space is reduced to a minimum, and the motor is out of the way of oil and dirt, and in addition all of the driving gears are incased. These machines are built in all sizes from 1-in. to 6-in. capacity, each size having a proper number of cutting speeds to handle the work for which it is designed.

#### Vacuum Car Cleaning.

The Vacuum Cleaner Company, of New York City, has contracted to put in Vacuum car cleaning apparatus for the Delaware, Lackawanna & Western at Hoboken, N. J. The apparatus is the Kenney patent, and power enough is to be furnished to clean 500 cars a day.

#### United States and Nicaragua Co.

Edwin W. Trimmer, recently United States representative at Bluefields, Nicaragua, has been appointed Consul at Port Deitrick. The city is named after James Deitrick, managing director of the syndicate whose concessions for the construction of railroads and the development of the mineral resources of the country embrace nearly one-third of the republic. Mr. Deitrick is now in New York. Prospect-

ing and developing has been carried on quietly by mining experts. It is said \$10,000,000 will be expended for railroads and mining equipment. The United States & Nicaragua Company is the name of the concern which will carry out the work. Subsidiary to the United States & Nicaragua Co. is the Central Railway Company, with a capital of \$10,000,000. Among those interested in these enterprises are James H. Lockhart, Alexander D. Peacock, Thomas B. Riter, John R. McCune, Robert Pitcairn, Dwight W. Pardee and L. J. Rees.—*Journal of Commerce* (New York).

#### Transportation Courses at the Brooklyn Polytechnic.

The Polytechnic Institute of Brooklyn offers a series of evening courses in transportation, beginning next October and extending through April. These lectures cover a large field and are given by thoroughly competent men, including B. B. Adams, George R. Henderson and Lawford H. Fry, among others who are well known to readers of the *Railroad Gazette*. The fee for the course in transportation is \$15, and the complete list of lectures in this course is as follows:

- Oct. 10.—How to Route the Line and Determine the Most Suitable Service.—Professor Lardner.
- Oct. 24.—Legal Points as to Franchises, Organization, Eminent Domain and Liability.—R. Burnham Moffat, Esq., Member of the N. Y. Bar.
- Nov. 7.—Problems in the Electrification of Steam Roads.—Professor Young.
- Nov. 14.—The Compound Locomotive; Its Design and Development.—Professor Fry.
- Nov. 28.—The Future Compound Locomotive.—Professor Fry.
- Dec. 12.—The Hauling Capacity of the Locomotive.—Professor Henderson.
- Dec. 20.—The Fuel and Water Consumption of the Locomotive.—Professor Henderson.
- Jan. 9.—The Strematograph and Its Revelations.—Professor Dudley.
- Jan. 16.—Where to Locate the Power House.—Professor Barstow.
- Jan. 23.—Fixed Signals.—Professor Adams.
- Feb. 6.—Block Signals.—Professor Adams.
- Feb. 13.—How to Design the Power House.—Professor Stott.
- Feb. 20.—The Gas Engines for Central Station Service.—Professor Mershon.
- Feb. 27.—How to Organize the Operating Force of the Power House.—Professor Stott.
- Mar. 6.—The Steam Turbine for Central Station Service, Its Sensibility as Compared with the Gas Engine.—Professor Mershon.
- Mar. 20.—Problems in Train Despatching.—Professor Ketchum.
- Apr. 3.—Maintenance of Way Problems.—Professor Palme.
- Apr. 17.—The Scandinavian Railroads under Government Ownership.—Professor Ihlseng.
- Apr. 24.—How to Operate the Complete Plant.—Professor Calderwood.

#### A Few Expense Items.

At Cleveland last week Mr. G. J. Grammer, vice-president of the Lake Shore, told the reporters that Cleveland would have a \$9,000,000 union station, \$3,000,000 of which will be the share of the New York Central lines as a part of an appropriation of \$60,000,000 for improvements to be made within the next three or four years. Other New York Central improvements already started, said Mr. Grammer, include the opening of the Clearfield coal district and the double tracking of the Big Four Railroad. The money has also been appropriated for the construction of the tunnel under the Detroit River for the Michigan Central, for which \$10,000,000 has been set aside. One of the other items is an expenditure of \$10,000,000 for additional terminals at Chicago.

#### Chicago Pneumatic Tool Company.

The Chicago Pneumatic Tool Company has issued an income statement for the half year ending June 30, 1905, showing that profits amounted to \$413,942. From this sum, \$57,705 was written off for depreciation, etc.; interest on bonds absorbed \$57,000, and \$25,000 was taken for sinking fund reserve; leaving \$273,737 as profit available for dividend. Out of this, dividends were paid at the rate of 4 per cent. per annum, at a cost of \$122,276; leaving \$151,461 as balance carried to surplus. After adding the surplus brought over from 1904, and making sundry deductions, a total surplus of \$376,898 was carried forward.

#### The Steel Rail Industry.

Consul H. W. Harris, at Mannheim, Germany, takes from the *Deutsche Bergwerks-Zeitung* the following table of rail exports, with the accompanying comment:

Year.	Exports of Rails from England, Germany, and the United States for 15 Years.		
	Tons.	Tons.	Tons.
1889-1891.....	England. 681,000.	Germany. 128,000.	United States. 11,000.
1892-1894.....	390,000.	107,000.	13,000.
1895-1897.....	512,000.	120,000.	51,000.
1898-1900.....	443,000.	130,000.	286,000.
1901-1903.....	531,000.	255,000.	185,000.

The vast concentration in the manufacture of American steel rails has rendered the United States able to enter into the sharpest competition with England and Germany in the export of rails. Prior to 1890 the export of rails from the United States never amounted to more than 8,000 tons in any one year; in fact, the country had large imports of rails. For example, in 1881, the imports were 296,000 tons; in 1882, 118,000 tons; in 1887, 77,000 tons; in 1888, 137,000 tons. With the year 1890 the United States began gradually to become a factor in the export of rails. These exports were in 1890, 10,000 tons; 1895, 12,000 tons; 1900, 348,000 tons; 1904, 161,000 tons.

The record in the export of rails during the last ten years was made by England in 1903 with 604,000 tons, by Germany in 1903 with 379,000 tons, and by the United States in 1901 with 375,000 tons. It will be seen how the United States, which in the eighties



imported at times 100,000 tons and more of rails per year, has now become an important factor in the export trade. This has been due in part to the low price made by Americans for rails as well as to concentration, the low price being in fact partly the result of competition. From 1875 on, the duty on rails was fixed at \$28 per ton, and was by further reductions made, respectively, \$17, \$13.50, and in 1894 \$7.75 per ton, the latter being since that date unchanged.

#### Transverse Strain in Brake-beams.

The above is the subject of a circular letter issued by the Chicago Railway Equipment Company relative to some experiments on vertical stresses in brake-beams made for that company several years ago. The assumption having lately been made that the tests referred to proved the existence of undue vertical stresses, the letter states that as a matter of fact they established the contrary. This fact was known to the company in advance, however, so the tests were made to learn why solid types of brake-beams were so often found to be buckled up or down. The investigations showed that while beams were often loaded much higher than the calculated load, the excess stress was in the line of normal pull. The real difficulty with the buckling of the solid beams was found to be in the fact that the I or T sections used were too light and therefore unsuited to the purpose for which used.

#### Altoona Yard.

The Pennsylvania now has at Altoona one of the largest railroad yards in the world. The yards extend a distance of seven miles, contain 205 miles of tracks and 1,050 switches, and have storage room for 10,500 cars. There is a daily average movement of through cars, east and west, aggregating 4,800, and an interchange of shop and track delivery at Altoona alone, of 1,500 cars. An average of 1,600 cars are shifted daily at the Juniata scales, and 2,400 cars at WN tower, in the east end of the yards. At these two points alone a daily average of 40 men is employed in dropping the cars.

#### The Master Painters' Convention.

The officers and executive board of the Association of Maintenance of Way Master Painters of the United States and Canada urge every one interested in the roadway, bridge or building painting of railroads, whether he be a foreman painter, an engineer of maintenance of way, a manufacturer, or even though he have no actual connection with railroad work, to send as early as possible to the Secretary, H. J. Schnell, 100 William street, New York City, suggestions for suitable practical subjects for discussion at the Cincinnati convention, Nov. 13 and 14.

#### An Extemporary Drawbridge.

The engineers of the Chicago & North-Western recently performed an unusual mechanical feat on the Peoria Branch of the road, by raising a 70-ton steel bridge about 30 ft. in the air to allow a dredge to pass under on its way down Five Mile creek, in Whiteside county, Illinois. In accordance with its contract the company is obliged to remove bridges across drainage ditches on the Peoria branch once in two years to allow dredges to pass, and the work must be done at the company's expense. This is the fifth time it has been done; but heretofore the bridge, 68 ft. long, has been swung to one side, and traffic delayed from two to three days. The job was accomplished this year so as to delay trains only five hours. The scheme was devised by F. H. Bainbridge, Assistant Chief Engineer of the road.

#### An Emigrant Railroad Station.

It is said that the railroads which carry emigrants from New York City to the West have agreed to join in building a union station near Ellis Island, to which emigrants can go directly from the Government immigrant station without being exposed to the tricks and crimes of the "sharks" who mislead and rob them in the city. Ellis Island is in the harbor near the New Jersey shore, south of the station of the Central of New Jersey, and the plan appears to be to build the station on a dock to be built in the shallow waters of the Bay at that point. A connection with the Central of New Jersey would permit the running of trains to all the other lines, including the West Shore division of the New York Central.

#### Law and Justice.

If the state's attorney, to prove a murder, were required to produce a witness who had ridden on the bullet from the assassin's pistol to the victim's heart, his task would be parallel to that imposed on the prosecutor who tries to enforce anti-saloon laws. So say the anti-saloon lawyers. From an account printed in the New York Tribune it would appear that a similar state of things prevails in a Long Island court. Says the Tribune:

"Three smoke cases were thrown out of court in rapid succession in the Court of Special Sessions, Long Island, yesterday because the Corporation Counsel did not prove that the particular smoke for the creation of which the arrests were made had been detrimental to the health of residents of the city. Justice Forker presided. Associated with him were Justices Fitzgerald and Keady. Albert Hastings, Augustus Von Nostrand and Everett Hubbard,

firemen employed by the Long Island Railroad Company, were arrested for burning soft coal and making a smoke which, Officer Riley said, blew from the railroad yard in Long Island City toward Borden Ave. Riley did not see the smoke hit anybody in the face, nor did the expert medical man, who was placed upon the stand by Joseph J. Matthews, Assistant Corporation Counsel, possess any knowledge as to whether that particular smoke was injurious, not having seen it."

#### Strict Orders.

The following notice was observed posted in the engine dispatcher's office at the roundhouse in a neighboring town on one of the railroad lines running out of Albany: "Trainmen on passenger trains must not go through the coaches with overalls on, without first taking them off."—*Albany Journal*.

#### Manufacturing and Business.

The offices of the Power Specialty Company, formerly at 126 Liberty street, New York, have been moved to 111 Broadway, New York.

The D. F. Holman Tracklayer Co., Chicago, recently sent one of its standard tracklayers to Havana, Cuba. The sale was made through a New York house.

J. R. McColl, recently Associate Professor of Steam Engineering at Purdue University, has accepted a position in the engineering department of the American Blower Co., Detroit, Mich.

The National Tube Co. has placed a large order for immediate execution, with the American Blower Co., Detroit, Mich. The contract embraces complete heating equipment for the five new Butt Weld Mills at Lorain, Ohio.

Wallace M. Probasco is now Vice-President of the Search-Light Publishing Company, which issues a paper called the Search-Light, weekly. It follows the publishing and advertising interests of important manufacturers and engineering firms; keeps an information library, and publishes books.

The Ingersoll-Rand Company moved to its new offices on the fourteenth floor of the Bowling Green Building, 11 Broadway, New York, on August 1. The offices of the Rand Drill Company at 128 Broadway and the Ingersoll-Sergeant Drill Company at 26 Cortlandt street have been given up.

The Pratt & Whitney Co., of Hartford, Conn., has made arrangements with the C. T. Patterson Co., Ltd., of New Orleans, La., to represent its small tool department in the southwest territory. The Patterson Co. has a very complete line of small tools, and is in a position to fill orders from its New Orleans establishment.

The Sullivan Machinery Company, Chicago, is making some important additions to its manufacturing plant at Claremont, N. H., in order to keep pace with the rapid growth of its business in air compressors, coal cutters, rock drills and other mining and quarrying machinery. The improvements comprise six new buildings, practically doubling the present plant.

The United States Reclamation Service has awarded to J. G. White & Co. the contract for irrigating the Yume Desert. A dam a mile long will be built across the Colorado River valley about 12 miles above Yuma, Ariz., which is on the Southern Pacific, and the irrigating canals will be supplied from sluiceways at either end of this dam. Work has already begun and the dam is expected to be finished within a year.

The Chicago & North-Western announces the establishment of an Industrial Bureau which is to furnish reliable information about desirable locations for new manufacturing enterprises along the North-Western Line. Water power, lumber, coal and other minerals, as well as an excellent supply of labor, are among the attractions mentioned. The Bureau is also anxious to co-operate with commercial organizations of communities along the company's lines.

Mr. C. H. Bowers, the General Sales and Purchasing Agent and New York representative of the Georgia Car Company, of Atlanta, Ga., has asked us to clear up the confusion caused by the conflicting reports that have been published in the railroad papers of the disposition of the plant of the Georgia Car & Manufacturing Company, of Savannah, Ga., recently sold in bankruptcy proceedings. As stated in these columns last week, it is this plant that has been acquired by the South Atlantic Car & Manufacturing Company, of Waycross, Ga., and not, as elsewhere reported, that of the Georgia Car Company. Plans are now under consideration to double the facilities of the Georgia Car Company, made necessary by the growth of the company's business.

In connection with the opening to settlement on August 28 of the lands of the Uintah Indian Reservation, the North-Western Line also sends a brief description of the reservation, which is in the north central portion of Utah, in Uintah and Wasatch counties. It extends from Green river on the east to Heber, the county seat of Wasatch county on the west and to the crest of the Uintah mountain range on the north. The reservation is reached by the Uintah Railway, which runs from Mack, Col., on the Denver & Rio Grande, to



Dragon, Utah. Thence the trip is by stage across the White river to Vernal. The suggestion is made that home seekers from the east can best reach the reservation by the Chicago, Union Pacific & North-Western line to Denver.

The Oriental Hotel, Manhattan Beach, Long Island, which was the headquarters of the June conventions of the Master Mechanics' and Master Car Builders' Associations, is having installed a private telephone exchange in the hotel. There will be a long-distance telephone in each room and at other convenient points throughout the hotel, the system comprising something like 400 stations, said to be the largest private branch exchange in a resort hotel in the world. Service will be through a common-battery private switchboard, representing the latest advancement in such telephone practice. It was expected to have the work practically completed by August 1st. Outside service will be rendered through the Coney Island central office of the New York & New Jersey Telephone Company.

#### MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies, see advertising page 24.)

##### Iron and Steel Institute.

The autumn meeting will be held at Sheffield, Eng., on the 26th, 27th, 28th and 29th of September. B. H. Brough, Sec., 28 Victoria street, London, S. W.

##### The Railway Signal Association.

The next meeting of this Association will be held at the Great Northern Hotel, Chicago, September 12, beginning at 10.30 a.m. Committee No. 9 will submit a number of new definitions and a number of tentative definitions to be discussed. Committee No. 8 on "Standard Specifications for Mechanical Interlocking and Material for Construction Work," will offer for discussion the specifications printed in the 1904 proceedings beginning with paragraph 40 and ending with paragraph 81.

The meeting will also be asked to discuss "What is the best method for adjustment of cost of maintenance, operation and inspection of joint interlocking plants?"

#### PERSONAL.

—Mr. David B. Howard, the retiring Auditor of the Wabash, has been in railroad service for 45 years. He was born in Moulmein, Burmah, where his father was a missionary, and he spent his early years there. He entered the service of the Chicago & Alton in 1860 as clerk in the Treasurer's office, and he remained in that office till 1865. He was Paymaster for two years and was Secretary and Treasurer of the St. Louis, Jacksonville & Chicago until 1873, when he became Auditor. He came to the Wabash as Auditor in 1879 and has filled that position since that time. Mr. Howard has been in poor health for two years.

—Mr. James Agler, who on June 1 of this year was appointed General Manager of the California Northwestern and the North Shore Railroads, was born in 1849 at Columbus, Ohio. He entered railroad service in 1865 as an operator on the Chicago & North-Western. In 1871, he went to the Union Pacific as operator and later became train despatcher. In 1872, he went to the Southern Pacific as operator, becoming later agent and trainmaster. He was appointed Superintendent of the Truckee division on Feb. 12, 1891, and in September of that year was transferred to the Shasta division. In 1896, he was Division Superintendent at Ogden, Utah, and in March, 1898, was transferred to the same position on the Western division. Here he remained until 1901, when he was appointed Manager, holding this position until his present appointment.

—Mr. A. C. Watson, who has been appointed Assistant Engineer of the Indianapolis Terminal and Vincennes divisions of the Pennsylvania Lines West of Pittsburg, was born at Canton, Ohio, in 1881. He graduated from Washington and Jefferson College in 1902 and immediately began railroad work on the Pennsylvania as

assistant in an engineer corps at Newcastle, Pa. In April of the next year he went to the Illinois Central as instrument man on location surveys. In July and August, 1903, he was in charge of a location party on this road, and on September 1 was appointed Assistant Engineer of the New Orleans division of the Yazoo & Mississippi Valley. He went to the Vandalia Railroad in May, 1904, and for the last six months has been in charge of preliminary and location surveys on that road. On July 22 he was appointed to his present position.

—Mr. F. B. Scheetz, who has been appointed Engineer of Bridges and Buildings of the Missouri Pacific and the St. Louis,



F. B. Scheetz.

Iron Mountain & Southern, was born in 1867 at Monroe City, Mo. He took the first three years of the Civil Engineering course in the State University of Missouri, leaving there in 1887 to begin railroad service in a location party of the St. Louis & San Francisco in Indian Territory. In 1888 he became rodman and levelman on the Kansas City, El Paso & North-eastern, going to the Missouri Pacific in 1889 as rodman. In 1890 and 1891, he was transitman on the construction of drawbridges over the Arkansas river, and in 1892 was engineer in charge of the construction of a drawbridge over the Little river in Louisiana. In the latter part of this year he left the Missouri Pacific and took charge of construction on the Missouri division of the Missouri, Kansas & Texas. From 1893 to 1896, he was engaged in maintenance work on the St. Louis, Iron Mountain & Southern, going, in the spring of 1896, to the bridge and building department of the Missouri Pacific and the St. Louis, Iron Mountain & Southern. From 1896 to 1905, he was Assistant Engineer of Bridges and Buildings. He was appointed to his present position on July 10.

#### ELECTIONS AND APPOINTMENTS.

**Baltimore & Ohio.**—J. B. Elliott has been appointed Master Mechanic at Newcastle Junction, Pa., succeeding J. Kirkpatrick, transferred.

**Beaumont, Sour Lake & Western.**—R. C. Wells has been appointed General Manager, with office at Beaumont, Tex.

**Birmingham & Atlantic.**—J. F. Fleetwood, Auditor and Superintendent, has resigned as Auditor, and has been succeeded in that office by George Duglinson.

**Chicago & North-Western.**—G. W. Dailey, Acting Superintendent of Telegraph, has been appointed Superintendent of Telegraph.

**Chicago, Burlington & Quincy.**—Conrad E. Spens, Assistant General Freight Agent, has been appointed General Freight Agent of the lines west of the Missouri river, succeeding D. O. Ives.

**Chicago, Cincinnati & Louisville.**—See Great Central Route.

**Chicago, Rock Island & Pacific.**—J. B. Smalley, Superintendent of the Iowa division, has been appointed Superintendent of the Kansas division, with headquarters at Topeka, Kan.

J. O. Crockett, General Superintendent of the Southwestern District, has resigned. F. T. Dolan, formerly General Superintendent of the Fort Worth & Denver City, succeeds Mr. Crockett.

C. E. Shields, heretofore Superintendent of Police, has been appointed Chief Special Agent of the Central and Northern districts, with headquarters at Chicago, and the title "Superintendent of Police" has been abolished.

**Colorado & Southern.**—James D. Welch, Chief Despatcher of the Wabash, has been appointed Superintendent of the Trinidad division, succeeding George Cotter, promoted.

**Flint River & Northeastern.**—J. F. Sikes, Trainmaster, has been appointed Superintendent. The office of Trainmaster has been abolished.

**Grand Trunk Pacific.**—B. B. Kelliher, Acting Chief Engineer, has been appointed Chief Engineer.

**Great Central Route.**—G. A. W. Dodge has been elected Secretary and Treasurer, with office at Cincinnati, Ohio, succeeding R. M. Allen.

F. J. Wheeler has been appointed Freight Claim Agent, with office at Cincinnati, Ohio, succeeding F. V. Davis.

**International & Great Northern.**—E. G. Bryant, Division Foreman, has been appointed Master Mechanic of the Fort Worth division, with headquarters at Mart, Tex. C. M. McLain, Division Foreman, has been appointed Master Mechanic of the San Antonio division, with headquarters at Taylor, Tex. Division Master Mechanics will have charge of all employees in the locomotive and car departments on their divisions, and foremen and others will report direct to them, B. F. Ackerman, Road Foreman of Engines and Cars, having resigned and the office having been abolished.

**Lake Erie, Alliance & Wheeling.**—E. A. Handy has been appointed Assistant General Manager. Samuel Rockwell has been appointed Chief Engineer, succeeding Mr. Handy. G. C. Cleveland has been appointed Assistant Chief Engineer, succeeding Mr. Rockwell. The headquarters of all these officers are at Cleveland, Ohio.

**Lake Shore & Michigan Southern.**—G. N. Dow, Master Car Builder at Collinwood, Ohio, has been appointed General Mechanical Inspector, with headquarters at Cleveland, Ohio. The office of Master Car Builder at Collinwood has been abolished and S. K. Dickerson, Master Mechanic, and M. D. Franey, Superintendent of Shops, have assumed the duties lately performed by the Master Car Builder.

**Litchfield & Madison.**—L. P. Atwood has been appointed Superintendent, with office at Edwardsville, Ill., succeeding T. C. Moorshead, resigned.

**Louisville & Nashville.**—W. E. Knox, formerly Superintendent of the Alabama Mineral division, has been appointed General Agent in charge of traffic in the Alabama railroad territory, with office at Anniston, Ala. W. E. Smith, Roadmaster at Birmingham, Ala., has been appointed Assistant Superintendent in charge of maintenance of the South & North Alabama Railroad, Birmingham Mineral and Alabama Mineral divisions, with headquarters at Birmingham, Ala. The jurisdiction of E. J. Haylow, Assistant Superintendent at Birmingham, and of James Ashworth, Master Mechanic at Birmingham, has been extended over the Alabama Mineral division. D. D. Briggs, heretofore Master Mechanic of the Alabama Mineral division, has been appointed Assistant Master Mechanic at Boyle's, Ala.

**Missouri & Louisiana.**—J. S. O'Flaherty has been appointed Chief Engineer.

**Missouri, Oklahoma & Gulf.**—F. T. Taylor has been elected Secretary, with office at Kansas City, Mo., succeeding J. C. Duffin, resigned.

**Missouri Southern.**—The officers of this company are as follows: John H. Coulter, President, with office at Chicago; C. W. Greer, Vice-President, with office at Leeper, Mo.; J. R. Lindsay, Secretary and Treasurer, with office at Chicago; L. F. Dinning, Attorney, with office at De Soto, Mo.; A. E. Yardley, General Manager; C. M. Phelps, Superintendent, and Walter Newman, Auditor, all with offices at Leeper, Mo.

**Northern Pacific.**—W. E. Alair, Division Freight Agent for Montana and Idaho, and J. O. Dalzell, Division Freight Agent for Minnesota and Dakota, have been appointed Assistant General Freight Agents, with offices at St. Paul, Minn.

**Pontiac, Oxford & Northern.**—Robert R. Lounsbury, Receiver, acts as General Manager, W. C. Sanford, General Superintendent, having resigned. F. H. Carroll has been appointed General Freight and Passenger Agent and Acting Superintendent.

**St. Louis, El Reno & Western.**—R. L. Jones, Auditor, has resigned. W. S. Wells, Commercial Agent, has been appointed Acting Auditor in addition to his other duties, with office at Guthrie, Okla. T.

**St. Louis, Watkins & Gulf.**—George J. Gould has been elected President, with office at New York; C. S. Clarke, Vice-President; F. W. Ireland, Secretary; D. S. Smith, Treasurer; S. B. Schuyler, General Auditor; all with offices at St. Louis, Mo. W. E. Lee has been appointed Auditor, and P. E. Chavanne, Assistant Treasurer, both with offices at Lake Charles, La.

**San Pedro, Los Angeles & Salt Lake.**—P. M. Sloan has been appointed Assistant General Freight Agent, succeeding H. B. Worden, resigned.

**Texas Short Line.**—L. P. Marnell is Auditor, with office at Grand Saline, Tex.

**Trans-Continental Railway Commission (Canada).**—The Hon. S. N. Parent has been appointed Chairman.

**Trinity & Brazos Valley.**—R. H. Baker has been elected President, with office at Austin, Tex.

**Wabash.**—L. J. Ferritor, Superintendent of the Western division, has been appointed Superintendent of the Middle division, with headquarters at Decatur, Ill., succeeding Stephen E. Cotter, promoted to be General Superintendent. J. C. Sullivan, Chief Despatcher of

the Eastern division, has been appointed Superintendent of the Eastern division, with headquarters at Peru, Ind., succeeding Mr. Ferritor.

**West Side Belt (Pittsburg).**—H. B. Henson has been elected Secretary and Treasurer, with office at New York.

W. P. Schaufele has been appointed Superintendent of Car Service with office at Pittsburg, Pa.

#### LOCOMOTIVE BUILDING.

*The Appalachian Northern* has ordered three locomotives from the F. M. Hicks Co.

*The State Railway of Chile* has ordered one locomotive from the Baldwin Locomotive Works.

*The Chicago, Burlington & Quincy* will build four switching locomotives at its Havelock (Neb.) shops.

#### CAR BUILDING.

*The Mexican Railway* has ordered 50 coal cars from the Pullman Co.

*The Chicago Great Western* has ordered one mail car from the Pullman Co.

*The Buffalo & Susquehanna* has ordered 15 dump cars from the Rodger Ballast Car Co.

*The Florida East Coast* has ordered 100 dump cars from the Rodger Ballast Car Co.

*The Hill Lines* are reported to have ordered 8,000 freight cars from the Haskell & Barker Co.

*The Arms Palace Horse Car Company*, of Chicago, has ordered 10 horse cars from the Pullman Co.

*The Atlantic Coast Line* has ordered 150 flat cars from the South Atlantic Car & Manufacturing Co.

*The Omaha, Lincoln & Beatrice* is reported to have ordered eight passenger cars for interurban service.

*The Chesapeake & Ohio* has ordered 500 box cars of 80,000 lbs. capacity from the American Car & Foundry Co.

*The Japanese Government* is reported to have ordered six passenger coaches from the Harlan & Hollingsworth Co.

*The Colorado & Southern* has ordered 200 Ingoldsby automatic dump cars from the Pullman Co. and also two dining cars.

*The New Orleans & Northeastern* has ordered 60 Hart convertible (class C. S.) dump cars from the Rodger Ballast Car Co.

*The Kansas City Southern* has ordered 100 dump cars and 200 National coal dump cars from the American Car & Foundry Co.

*The Middletown Car Works* have received an order from Hugh Kelly & Co., of New York, for 150 20-ton steel-frame cane cars, for use in Cuba.

*The Gulf Refining Company*, of Pittsburg, has ordered 100 steel underframe tank cars of 8,000 gallons capacity from the Standard Steel Car Co.

*The F. M. Hicks Co.* has booked orders for 40 flat cars for McArthur Bros., Chicago; four 40-ft. flat cars for the Marysville & Northern, and 15 flat cars for the Appalachian Northern.

*The Tidewater* has ordered 110 box cars of 80,000 lbs. capacity from the Western Steel Car & Foundry Co. in addition to orders recently reported, and 20 dump cars from the Rodger Ballast Car Co.

*The Pennsylvania Refining Company*, of Oil City, Pa., has ordered two three-compartment tank cars of 8,000 gallons capacity from the Bettendorf Axle Co. They will have steel underframes, Bettendorf trucks and Miner draft rigging.

*The Archer-Daniels Linseed Co.*, Minneapolis, Minn., has ordered two steel tank cars of 60,000 lbs. capacity from the Bettendorf Axle Co. These cars will weigh 30,000 lbs., and measure 31 ft. long, 9 ft. wide and 13 ft. high, all outside measurements. The special equipment includes: Bettendorf bolsters, brake-beams and trucks; Walsh brake shoes, Westinghouse air-brakes, Tower couplers, Miner friction draft rigging, Harrison dust guards, Camel journal boxes and Griffin Wheel Co.'s wheels.

*The Harriman Lines*, as reported in our issue of July 28, have ordered 1,250 box and 300 stock cars for the Southern Pacific, 1,100 box cars for the Union Pacific, 300 stock cars for the Chicago & Alton, and 200 box and 100 stock cars for the Oregon Railroad & Navigation Co. from the Western Steel Car & Foundry Co., and 100 flat cars for the Oregon Railroad & Navigation Co., 100 box cars for the Southern Pacific, and 100 drop bottom gondola cars for the



Union Pacific from the American Car & Foundry Co. They have also ordered 300 gondolas for the Chicago & Alton from the Pressed Steel Car Co. This is in addition to orders recently reported.

### BRIDGE BUILDING.

ASHLAND, KY.—The Ashland & Ironton Bridge Co. has been organized, with a capital stock of \$1,500,000, to build a bridge over the Ohio river, connecting Ashland with Ironton, Ohio. O. E. Fischer has been appointed Chief Engineer with office in Cincinnati. The Cincinnati, Hamilton & Dayton is interested in this bridge project.

BOSTON, MASS.—The following bids were received by the City Engineer for the stone work on the Northern avenue and Atlantic avenue bridges: For the Northern avenue bridge: Metropolitan Construction Co., \$178,000; W. L. Miller, \$172,765; J. J. Coughlin Construction Co., \$157,450; P. McGovern, \$157,000; Holbrook, Cabot & Rawlins, \$155,000; Lawler Bros., \$145,630; W. H. Ellis, \$137,790. For the Atlantic avenue bridge: Lawler Bros., \$75,000; W. L. Miller, \$73,671; W. H. Keyes, \$69,580; Globe Construction Co., \$44,768; J. J. Coughlin Construction Co., \$43,500; P. McGovern, \$41,400.

BROWNSVILLE, TEX.—A concession has been granted to Timoteo Castaneda by the Mexican Government to build a bridge over the Rio Grande at this place. It is proposed to induce the Gulf Coast Line Railroad to use the bridge.

BUFFALO, N. Y.—The Lackawanna has begun the erection of a four-span steel bridge over the tracks of the Erie. This bridge will be 800 ft. long and the superstructure will weigh 3,000 tons. It will cost \$250,000. A number of other bridges in Buffalo are to be strengthened.

CHICAGO, ILL.—The Board of Trustees of the Sanitary District of Chicago has advertised for bids on a Scherzer rolling lift bridge over the Chicago river at Dearborn street. The bids will be received up to October 4.

CORNWALL, ONT.—Bids will soon be asked for five steel bridges to be built in connection with the River Aux Raisins drainage scheme in the townships of Osnabruck and Cornwall.

DAYTON, OHIO.—Proposals will be received up to August 26 for building the superstructure of the bridge over Big Twin creek, to consist of two spans each 150 ft. long. T. J. Kauffman, County Auditor.

DECATUR, ILL.—A reinforced concrete bridge will be built over the Sangamon river at South Monroe street. Bids have not yet been advertised for.

HILLSBORO, ORE.—Contracts have been let to Wakefield & Jacobson for building four bridges on the line of the Portland, Nehalem & Tillamook.

GLOUCESTER, MASS.—A Scherzer lift bridge of 40-ft. span will be built over the canal. The bridge will be used by the Boston & Northern Street Railway.

GREAT FALLS, MONT.—The Great Northern will build a new bridge over the Missouri river at this place, to replace the present wooden structure. The new bridge will be 1,045 ft. long and will cost \$100,000.

MANITOWOC, WIS.—The contract for the foundations for a bridge 900 ft. long on the Green Bay extension of the Chicago & North-Western has been let to Adolph Green, for \$75,000.

MENOMINEE, WIS.—The contract for building the new bridge over the Red Cedar river has been let to the Minneapolis Steel & Machinery Co., for \$12,300.

MONTCLAIR, N. J.—A steel viaduct will be built over the Lackawanna tracks at Bloomfield avenue. The cost is estimated at \$60,000. James Owen, County Engineer, Montclair.

MUSKOGEE, FLA.—Bids will be received until October 1 for building a steel bridge over the Peridido river. A. N. McMillan, Clerk of the Board of County Commissioners, Pensacola, Fla.

OWEN SOUND, ONT.—A new steel bridge to cost \$11,000 will be built by the city at Poulett street.

PEORIA, ILL.—The City Council has authorized the building of a bridge over the Illinois river. Plans have not yet been prepared.

PITTSBURG, PA.—Press reports state that the Pittsburgh & Lake Erie is negotiating for a charter to build a bridge over the Monongahela at lock No. 4, between Charleroi and Monessen.

TUNKHANNOCK, PA.—The Lehigh Valley has let a contract to S. B. Mutchler & Son for the foundations of a new steel bridge to be built over Tunkhannock creek. The new bridge will have four spans and will be a deck truss structure.

VAN BUREN, ARK.—The Fort Smith & Van Buren Bridge & Trac-tion Co. has been incorporated, with a capital stock of \$50,000. It is

proposed to build a bridge over the Arkansas river at Van Buren. H. E. Kelly is President.

VANCOUVER, B. C.—The Canadian Pacific has let a contract to the British Columbia General Contracting Co. for replacing the wooden piers of the company's main line bridge over the Pitt river with concrete piers. The contract price is \$40,000.

WOODWARD, OKLA. T.—Bids are wanted August 28 for building three steel bridges near this place. They will be 180 ft., 60 ft. and 330 ft. long, respectively. C. C. Hoag, County Clerk.

YORK, PA.—The York Furnace Bridge Co. has been incorporated to build a highway bridge over the Susquehanna river at York Furnace.

### Other Structures.

BARING CROSS, ARK.—The St. Louis, Iron Mountain & Southern, it is reported, will build a new coach shop here.

BEATRICE, NEB.—The Chicago, Burlington & Quincy will begin work this month on a new passenger station at this place, to cost \$50,000.

BEAVER, PA.—The Pittsburgh & Lake Erie has let a contract to the Nicola Construction Co., of Pittsburgh, for building a new roundhouse to cost \$50,000.

CHATTANOOGA, TENN.—The Central of Georgia, it is reported, will build a new freight and passenger station on Market street.

CLEVELAND, OHIO.—It has been announced by the Lake Shore that a new union depot to cost \$5,000,000 will be built as soon as plans can be prepared. The work will include track elevation entirely across the city. The expense will be borne by the Pennsylvania.

DAVENPORT, IOWA.—It is reported that the Chicago, Burlington & Quincy and the Chicago, Milwaukee & St. Paul have agreed to build a union station to cost \$200,000.

GRAND RAPIDS, MICH.—Contracts will soon be let for the new Grand Trunk passenger station at this place. The building will be 90 x 100 ft. and will cost about \$70,000.

INDIANAPOLIS, IND.—A new power plant to cost \$50,000 will be built for the Indianapolis Union Station. Other improvements to cost \$25,000 will also be made.

LORAIN, OHIO.—The Baltimore & Ohio is rebuilding its round-house and machine shop which were burned last winter. The new roundhouse will be of brick, with a slate roof, and will have 14 stalls.

LOUISVILLE, KY.—The Louisville & Nashville has let the contract for rebuilding its passenger station which was burned two weeks ago, to the Selden-Breck Construction Co., of St. Louis, Mo. Work was begun on August 1 and the contract calls for the completion of the station by December 1. The cost is \$200,000.

McKEES ROCKS, PA.—The Pittsburgh & Lake Erie has begun work on a new car shop, which will cost \$100,000.

PHILADELPHIA, PA.—H. B. Shoemaker & Co., general contractors for the new Gray's Ferry shops of the Pennsylvania, are asking bids on the sub-contracts which will be let.

SAVANNAH, GA.—The Seaboard Air Line will build two new warehouses and two new cotton sheds here. These, with other improvements, will cost \$150,000.

STAUNTON, VA.—John Wilson, Richmond, Va., has the contract to erect a new passenger station for the Chesapeake & Ohio at this place. The station will cost \$30,000.

### RAILROAD CONSTRUCTION.

#### New Incorporations, Surveys, Etc.

ATCHISON, TOPEKA & SANTA FE.—The engineering department is making estimates for double tracking the road from East Fort Madison to Stronghurst, Ill., 20 miles.

BALTIMORE & OHIO.—Plans are being made by this company for extensive improvements in Wheeling, W. Va., which will cost about \$2,000,000. The work includes the eliminating of grade crossings and the building of a new station.

BEAUMONT, SOUR LAKE & WESTON (ST. LOUIS & SAN FRANCISCO).—Contracts, it is said, will shortly be let for building the western extension of this road, which was recently sold to the St. Louis & San Francisco. The proposed line will run to Houston instead of to a connection with the Trinity & Brazos Valley. (See Construction Record.)

BUCK CREEK & CATAWBA RIVER.—A charter has been granted a company under this name in North Carolina, with a capital of \$500,000, to build a railroad from a point in McDowell County, N. C., near the mouth of Buck Creek, down the valley of the Catawba river to the North Toe river to a point where it crosses the state line of Tennessee, passing through McDowell, Mitchell and Yancey counties,



a distance of about 100 miles. C. Boice, of Abbingdon, Va.; G. W. Edwards, of Winston-Salem; J. Crawford Biggs, of Durham; L. D. Heart, W. B. Jones and S. J. Hinsdale, of Raleigh, are interested. The line described quite nearly coincides with that of the Johnson City Southern, the chartering of which was reported in the *Railroad Gazette* of June 30 last.

**CHICAGO, CINCINNATI & LOUISVILLE.**—This company, it is said, has extensive improvements under way in West Marion, Grant County, Ind. The work includes the eliminating of a number of grade crossings at a cost of over \$200,000, the grade being raised about 20 ft. Hickey & Hannon are the contractors.

**CRITTENDEN RAILROAD.**—This company has been incorporated in Arkansas, with \$150,000 capital, to build from Earl to Heth, St. Francis County, 15 miles. The incorporators are: R. E. Stonbrake, N. H. Walcott, C. C. Gardiner, H. C. Hawley and J. R. Blair.

**DECKERVILLE, HYDRICK & WESTERN.**—This company has been incorporated in Arkansas, with \$216,000 capital stock, to build from Deckerville, Poinsett County, through Poinsett, Crittenden and Cross Counties, 27 miles. The incorporators are: G. W. Patterson, S. A. Austin, E. B. Smith, F. H. Farnham, Charles Patterson, W. E. Reichardt, N. B. Metcalf, of Earl; C. B. Bailey, of Wynne, and Earl Hannan and T. E. Hare, of Vandale.

**ERIE.**—The contract has been awarded to Bennett & Talbot, of Greensburg, Pa., for building the first section of 12 miles of the Guymard cut-off, extending from Howells to Guymard, N. Y. This section includes a 5,300-ft. double-track tunnel through the Shawangunk mountains.

**ERIE, CAMBRIDGE, UNION & CORRY (ELECTRIC).**—This Pennsylvania company proposes to build a railroad from Erie to Corry, Pa., with a branch to Cambridge Springs, 42 miles in all. It is proposed to have private right of way throughout the line, except in cities and towns. The capital stock of the company is \$1,000,000, and an issue of \$1,000,000 in first mortgage 5 per cent. 30-year gold bonds has been authorized. The bond issue is being underwritten by H. P. Taylor & Co., of Pittsburgh. It is estimated that the cost of building the road, including the right of way, will be \$900,500.

**GRAND TRUNK PACIFIC.**—Plans for the location of the line from Portage la Prairie westward for a distance of 275 miles, have been approved. From Portage la Prairie to a point just west of Macgregor, the line will nearly parallel the Canadian Pacific, and then it will run west to the Assiniboine river, with a branch about 14 miles south into Brandon. The road will then cross the Arrow river, near Crandell; thence west to the Assiniboine river near Crewe, in Marquette, Manitoba, and thence up the valley of the Big Cut Arm creek to a point a little north of Sumner, Assiniboia.

**LAKE SHORE & MICHIGAN SOUTHERN.**—This company intends to build a line between Franklin and Clearfield, Pa., 76½ miles, and is receiving bids for the construction of the portion between Franklin and Brookville, Pa., 42½ miles.

**LEHIGH VALLEY.**—This company, it is said, has bought a strip of land about a mile long, which is to be used in making additions to its yards at Coxton, Pa.

**MEXICAN CENTRAL.**—This company, it is said, will extend its Paredon line north, from the coal fields to which it is now being built, to San Antonio, Tex., if permission is granted by the Mexican Government. Surveys for this line were made about two years ago.

**MOBILE & WEST ALABAMA.**—An officer writes that this company, which has completed the location of its line from Mobile to Florence, Ala., and also a branch into Birmingham, holds options on lands for terminals in Mobile, Birmingham, Tuscaloosa, Demopolis and Florence. Rights of way have been secured from Mobile to Demopolis. The company controls the Dauphin Island Dock & Railway Company's lines and property, including all of the Big and Little Dauphin Islands, except such land as is occupied by the United States Government. The road will have a maximum grade of .6 per cent. and a maximum curvature of 6 degrees. A heavy traffic is expected in coal, pig iron, coke and export freight. From Tuscaloosa the grade is light, but there are some deep cuts. There will be several long trestles. Above Tuscaloosa the work is heavy, with rock cuts, several tunnels and several high viaducts.

**MORELIA & TACAMBARO.**—A. J. Peyton & Co., New York, have underwritten \$1,200,000 of bonds to provide funds for building the first 55 miles of this proposed road. The capital stock of the company is \$11,000,000, of which \$5,000,000 is in first mortgage 5 per cent. bonds and \$6,000,000 in stock, in shares of \$50 each. (See *Construction Record*.)

**NASHVILLE, CHATTANOOGA & ST. LOUIS.**—This company is reported making preliminary surveys to build a line in Tennessee to the Pryor Ridge coal fields.

**NEW YORK CENTRAL & HUDSON RIVER.**—A committee of citizens who are trying to secure the elevation or depression of the

tracks of the New York Central in Tenth and Eleventh avenues, New York City, announce that the company has promised to lay before the next legislature a plan for the removal of the tracks from the surface of the streets. These tracks, which are used almost exclusively by freight trains, and over which the speed is restricted to a very low rate, extend from Sixtieth street southward to St. John's Park, about 3 miles.

**NORTHERN PACIFIC.**—It is reported that this company will build from Detroit, on its main line, to Bemidji, 60 miles.

**ONTARIO POWER DEVELOPMENT COMPANY.**—This company has decided to build an electric road from Niagara Falls, Ont., to Toronto, via Brantford, London, Paris and Ingersoll, a distance of about 100 miles.

**PENNSYLVANIA.**—The contract for the construction of an extension of 14 miles from Brownsville, Pa., to Rice's Landing has been let to S. M. Green, of Uniontown, Pa. Keller & Crossan, of Philadelphia, will do the grading.

**PORTLAND, NEHALEM & TILLAMOOK.**—The Atlas Construction & Supply Co., of San Francisco, which has the contract for laying the first 20 miles of track, has awarded to Clark & Dixon, of Forest Grove, the contract for clearing the right of way and to Thompson Bros. the contract for grading the first three miles from Hillsboro.

**ST. LOUIS, IRON MOUNTAIN & SOUTHERN.**—An officer confirms the report in our issue of July 28 that a contract has been given to Johnston & Grommet Bros. for the clearing, grading and bridging of the new line from Eudora, Ark., to Gilbert, La., 78 miles. The work is not heavy, the maximum grade being .3 per cent, and the maximum curvature 1 per cent, without any important steel bridges, trestles or tunnels.

**SOUTH SIDE COAL & RAILWAY.**—This company has been incorporated in Arkansas, with \$1,250,000 capital, to build from Paris, Logan County, to Dardanelle, Yell County, 38 miles. The incorporators are: T. D. Kinman, A. Hall, H. Strother and William Allen, Jr., of Dardanelle; D. E. Bradshaw, of Little Rock; George D. Locke, of Jerseyville, Ill., and A. R. Smart, of Chicago.

**TOLEDO & LIMA (ELECTRIC).**—E. L. Myers & Co., of Chicago, have been awarded the contract for the grading and concrete bridge work of this company, and will begin work at once.

#### RAILROAD CORPORATION NEWS.

**CHICAGO UNION TRACTION.**—An issue of receiver's certificates maturing February 1, 1906, has been authorized to refund the \$400,000 first-mortgage bonds of the Chicago Passenger Railway Co., which matured August 1, 1903.

**CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.**—The New York Stock Exchange has been asked to list \$1,000,000 additional general-mortgage 4 per cent. bonds of 1993. This makes the total amount listed \$20,749,000.

**HOCKING VALLEY.**—The New York Stock Exchange has listed \$2,479,000 Columbus & Toledo extended first-mortgage 4 per cent. bonds of 1955.

**KANSAS CITY, FORT SCOTT & MEMPHIS.**—The New York Stock Exchange has listed \$957,000 additional guaranteed refunding-mortgage 4 per cent. bonds, making the total amount listed \$17,810,000. The additional bonds were issued for retirement of equipment and other underlying bonds, for improvements and extensions.

**LAKE SHORE & MICHIGAN SOUTHERN.**—The New York Stock Exchange has been asked to list \$10,000,000 additional 4 per cent. debenture bonds of 1928, making the total amount listed \$50,000,000.

**PHILADELPHIA RAPID TRANSIT.**—The total gross income for the year ending June 30 was about \$16,400,000, an increase of \$470,000 over the preceding year.

**SEABOARD COMPANY.**—The \$18,000,000 5 per cent. first preferred stock of this company issued under the accepted plans for the reorganization of the Seaboard Air Line, have been all subscribed for by the stockholders of the Seaboard Railroad Co. (June 9, p. 119.)

**TRINITY & BRAZOS VALLEY.**—The outstanding bond issue of \$1,850,000 has been canceled, and a new first mortgage at \$30,000 per mile, on road now owned or hereafter acquired, has been made to the Old Colony Trust Co., of Boston, as trustee, to secure an issue of 6 per cent. bonds.

**WILKESBARRE & HAZLETON.**—Rudolph Kleybolte & Co., of New York, are offering at 101 and interest \$500,000 5 per cent. gold bonds of 1951. This is part of an authorized issue of \$2,500,000, of which \$1,900,000 are outstanding and \$600,000 reserved to retire Lehigh Traction bonds.

**WISCONSIN & MICHIGAN.**—A mortgage has been filed with the Equitable Trust Co., of Chicago, as trustee, to secure \$2,500,000 bonds.

